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War and the American Telephone Industry.

What about the war in Europe? Will it affect the telephone industry in this country? These are questions which telephone men are asking before shaping up plans for the future. To obtain an insight as to the probable effect of the European war upon the telephone industry of this country, it is necessary that consideration be given to some of the general conditions which have resulted from the maelstrom in which the European nations have been engulfed.

European capital has played an important part in the development of many enterprises in this country. It has been estimated that in recent years securities to the amount of about $300,000,000 have annually found a market among European investors. One authority has placed the total amount of the European holdings of American securities as high as $6,000,000,000. During the last week of July, as the war clouds gathered, many of these investors hastened to dispose of their securities. With such tremendous offerings of stocks and bonds, there could be but one result—a great fall in prices and demoralization of the market. The stock exchanges of Europe closed and the New York exchange became the world's target, as the Europeans wanted gold in exchange for their holdings. Securities amounting in value to millions of dollars were dumped upon the New York market and prices fell 10 to 20 points on the most stable securities. To prevent complete demoralization of the market and to check the rapidly increasing movement of gold from this country to Europe which, if prolonged, would have had disastrous effects, the New York Stock Exchange was closed.

It is quite probable that when the New York and other exchanges open, there will be a further liquidation by European investors. Already, the European governments are announcing war loans to provide funds for carrying on the terrific struggle for supremacy. More loans will follow and capital which formerly was invested in American stocks and bonds will be placed to a great extent in these war loans.

As a result of the withdrawal of European capital from American investment, millions of dollars of securities of the highest grade will be absorbed by the investors of this country. There will, therefore, be no market for new issues of securities. Funds for the carrying out of new projects and new construction work will be exceedingly limited. The Chicago banks are now loaning call money at 6 to 8 per cent. and most of the sums available for such purposes have been taken.

In view of the conditions outlined, a survey of the telephone field from the point of view of the operating companies will reveal a particularly fortunate condition. The Independent telephone companies, as a general rule, have not relied upon the New York and Chicago money markets for their financing. The money necessary for their development and extension has been raised locally. The local investors know the telephone securities are good investments. Therefore Independent companies will not be affected to any appreciable extent when they seek funds for new construction and improvements. It is true that the securities may have to be disposed of at rates less advantageous to the companies than if issued under normal conditions.

The Bell companies, which depend largely upon the New York market for their financing, are in such condition that several months ago it was stated no new financing would be necessary until 1916. At the present time, the American Telephone & Telegraph Co. has, it is reported, sufficient funds on hand to supply the demands of its associate companies for any ordinary amount of new work.

As telephone service is now considered so essential to our modern life, there is little likelihood of revenues being reduced. While some subscribers may be lost during the readjustments which will be necessitated in some lines of business, the loss will be more than made up by the new business, which will surely come after the country gets into its stride under the new conditions thus suddenly thrust upon us.

There probably will be difficulty experienced by manufacturers of telephone apparatus and supplies in obtaining some classes of raw materials. This, however, is a situation which confronts manufacturers in other industries and one which will be taken care of in the readjustments which

are already under way. The telephone industry has progressed to such an extent that substitutes for practically all imported raw materials have been or can be developed in case the supply is materially curtailed.

The European export business of the telephone manufacturers has been small. The Western Electric Co. has a number of factories in Europe and these, it is understood, are closed on account of the employes going to the war. These factories are all operated as separate organizations with which the company in this country is closely affiliated, although its finances are carried separately. The export business of the company has not been large, according to a statement by President H. B. Thayer.

Attention of business men engaged in many lines of trade has been directed to the opportunity presented, or rather forced upon us, for wresting from the warring European nations, the profitable and growing trade with South America. It has only been in the last few years that attempts have been made to build up business with our sister continent to the south. The efforts have not been successful to any degree on account of the European dealers being strongly intrenched. The reasons for the non-success of the efforts to secure portions of the South American trade have lately been carefully studied. Now the government and various commercial organizations have data which will be extremely useful at the present time in attracting and permanently holding a large portion of the business which is now coming to us from South America.

Europe has furnished practically all the telephone apparatus in use in South America, but with the new commercial awakening as to the value of the export business which may be developed, there is no reason why the telephone manufacturer should not claim his share. It is predicted that the next great railroad building era will center in South America. That means rapid development of the country, necessitating more extensive telephone service. Right now is the time to get in on the ground floor.

The telephone industry then, as a whole, will not be adversely affected by the European war. Indeed, with this country upon the threshold of what is predicted will be an era of great prosperity, the business should be a better one than ever before.

The Snail Can't Get the Giraffe's Viewpoint

By HERBERT KAUFMAN

"Sight is an unnecessary sense," insisted the mole. "I know, because I do not require it."

"The giraffe can't make me believe that he can see over a blade of grass," remarked the snail. "I tried it and failed, therefore my opinion is fortified by unassailable proof."

"I am informed," commented the eel, "that hens do not swim. Sheer popycock! For if that were so, pray tell me, how could the unfortunate creature manage to get about?"

It is human and every other sort of nature, to discount what we can't discern. Most men find it hard to perceive what they fail to achieve. They ridicule what lies beyond the reach of their reason, and deny the possibility of performances out of their own range. There's a new point in every viewpoint.

Each mind is unique. No two brains are counterparts. Everybody is a bit of a specialist with at least one faculty sharper than its fellows.

Nature has endeavored to standardize us, but training and environment upset her plan and create aptitudes and prejudices which in turn produce individuality.

We are prone to hold dearest that which is nearest, and to estimate values by standards of experience and expediency.

The skilled artisan unhesitatingly declares himself a more useful being than the contemplative scientist, and correspondingly exalts tools above rules. The empiricist insists with equal vehemence that he is a more valuable member of society than the laborer, and places the plan higher than the man.

Thus our occupations and diversions and predilections unconsciously tend to tinge our ideas and falsify the weights and judgment. However open-minded we endeavor to be, all of us are occasionally impulsive bigots.

We cannot advance faster than our faith in other men's prowess. The nation readiest to stimulate faith, applaud ambition, and welcome originality, develops the greatest power and creates the most sources of wealth.

We must look upon the inventor, the pioneer, and the discoverer in their true light—as mediums through whose highly sensitized faculties opportunity delivers her messages to mankind.

Recognition of superiority demands self-depreciation, and "Old Adam" is too conceited to surrender his high opinion of himself without a dogged fight.

It is hard for a snail to get the giraffe's viewpoint.

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Predetermination of Current and Voltage at End of Line

Methods of A Partly Graphic and Partly Mechanical Nature for Easy Determination of Current and Voltage at Receiving End of a Telephone Line, Adapted for Practical Use—Lecture Before Manchester Section of The Institution of Electrical Engineers

By J. A. Fleming, M. A., D. Sc., F. R. S.

Although the mathematical treatment of the theory of the propagation of alternating currents along linear conductors has been fully dealt with by various writers, and chiefly by the work of Dr. A. E. Kennelly has been reduced to a form in which it admits of easy arithmetical application in particular cases, there still seems room for some simplification in those practical cases in which an accuracy in results beyond that attainable by the slide rule is not required. The methods here described depend partly on mechanical and partly on graphic processes, but are sufficiently good for much practical work.

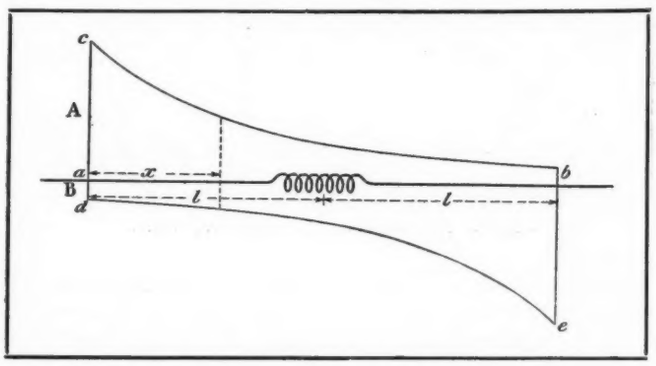

Fig. 1. Cable with Receiving Instrument at Center.

Every conductor we use for telephony, or for the electrical transmission of power, has four primary and four secondary qualities. The four primary qualities are all scalar quantities, and the secondary are quasi-vector quantities.

The primary constants are the inductance, L, the capacity, C, the conductor resistance, R, and the dielectric conductance of the line, S, and are reckoned in henrys, farads, ohms, and mhos per mile or per kilometer of loop or double line. The first two are conservative and the last two dissipative qualities. In virtue of the first two, energy is stored up in magnetic and electric form around the conductor and in the dielectric.

The four secondary qualities of the line are the vector impedance, the vector admittance, the propagation constant, and the line impedance or characteristic. These secondary quantities are denoted by the symbols Im, Ad, P, and Z. They are reckoned at so much per mile or per kilometer, and being quasi-vector quantities have size as well as position angle. The size of these vectors is denoted by putting square brackets round the symbols, viz. $[Im]$, $[Ad]$, $[P]$, and $[Z]$.

These vector quantities are defined as follows: Consider a unit length of the conductor subjected to simple harmonic electromotive force, formed of a part of a lead and the corresponding length of the return wire, this unit length being so short that the drop in voltage and current along it is graphically represented by a straight line. Then if I is the current at the center of the unit, and V is the potential difference at the center between its two wires, and L, C, R, and S are its constants as above, the drop in voltage along it is represented by $R\,I + j\,p\,L\,I$ and the drop in current by $S\,V + j\,p\,C\,V$, where $p = 2\,\pi \times$ frequency, and j is the sign of perpendicularity. Both these last two quantities are true vectors and denote a voltage or a current.

It is convenient, however, to represent them as the product of a quasi-vector and a current or voltage, viz. as

$$\{R + j\,p\,L\}\,I \text{ and } \{S + j\,p\,C\}\,V,$$

and to treat these quasi-vectors as vectors in calculations. Hence their respective sizes are

$$\sqrt{R^2 + p^2 L^2} \text{ and } \sqrt{S^2 + p^2 C^2}.$$

For unit length of the conductors we have symbols for these quantities as follows:

$$R + j\,p\,L = Im, \quad S + j\,p\,C = Ad,$$
$$\sqrt{R^2 + p^2 L^2} = [Im], \quad \sqrt{S^2 + p^2 C^2} = [Ad].$$

Now the quantity P, or the propagation constant, is the geometric mean of the vector impedance Im and the vector admittance Ad, or $P = \sqrt{Im} \times \sqrt{Ad}$, while the line characteristic or impedance Z is the quotient of the same quantities, or $Z = \sqrt{Im} \div \sqrt{Ad}$.

Returning then to the unit length of the circuit, we can express the drop in voltage and current as follows:

Drop in voltage $= Im \times$ mean current in it.

Drop in current $= Ad \times$ mean voltage across it.

Hence the drop in the drop in voltage, or as it may be called the (drop)^2 in the voltage, is given by the equation:

Drop in the drop in voltage

$$= Im \times Ad \times \text{mean voltage across it.}$$

If we draw an exponential or logarithmic curve, that is a curve where equation is $y = \epsilon^{Px}$, where ϵ is the base of the Napierian logarithms, it is clear that the slope of the curve at any point is proportional to the ordinate, or is equal to Py. Also the slope of the slope or rate of change of slope is proportional to the ordinate and equal to $P^2\,y$. Accordingly it is evident that if an alternating E.M.F., V_1, is applied at any point in an infinitely long cable, the voltage V at any other point at a distance x, will be represented by the exponential expression $V = V_1 \epsilon^{-Px}$. In practice, however, all our cables are of finite length, and we have moreover to take into account the effect of the receiving instrument at the end.

Consider then a cable of length l having a receiving instrument of impedance $R_2 + j\,p\,L_2$ placed at the receiving end, and an impressed electromotive force V_1 applied at the sending end. We may consider that the cable is laid out straight (Fig. 1) and that the applied E.M.F. is represented by a positive potential at one point and an equal negative potential at another point placed at a distance $2\,l$ in an infinite cable. The receiving instrument is represented by the coil placed in the center. Then each potential falls along the cable according to an exponential law, and the potential V at any distance x from the sending end is seen to be the algebraic sum of two factors, or

$$V = A\epsilon^{-Px} + B\epsilon^{+Px} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

It is now convenient to substitute for these exponential expressions their equivalent in hyperbolic functions.

If we draw two exponential curves, one rising and the other falling, and both starting from an ordinate $y = 1$ at $x = 0$, these curves have ordinates $y = \epsilon^x$ and $y = \epsilon^{-x}$ at any abscissa x (Fig. 2). If we take half the sum and half the difference of the ordinates at any abscissa, these values are called respectively the hyberolic cosine and the hyperbolic sine, and are represented by $\cosh x = \frac{1}{2}\,(\epsilon^x + \epsilon^{-x}) \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$

and $\sinh x = \frac{1}{2}\,(\epsilon^x - \epsilon^{-x}) \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$

Hence $\epsilon^x = \cosh x + \sinh x \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$

$\epsilon^{-x} = \cosh x - \sinh x \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$

Substituting these functions for ϵ^{+Px} and ϵ^{-Px} in (1), we have

$$V = (A + B) \cosh P x - (A - B) \sin P x \ldots\ldots (6)$$

It is clear that when $x = 0$ we have $V = V_1$, and also $\cosh P x = 1$ and $\sinh P x = 0$; therefore we have $V_1 = A + B$.

Again the current I in any unit of length of the cable is obtained by dividing the drop in potential along it by the vector impedance of the unit.

Hence we have

$$I = \frac{P}{R + j p L} \cdot \left\{ A\epsilon^{-Px} - B\epsilon^{+Px} \right\} \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

$$I = \frac{I}{Z} \left\{ (A - B) \cosh P x - (A - B) \sinh P x \right\} \ldots (8)$$

and when $x = 0$ we have $I = I_1$; therefore $Z I_1 = A - B$.

Substituting the values $A + B = V_1$ and $A - B = Z I_1$ in equations (6) and (8), and also bearing in mind that the receiving instrument impedance $Z_r = V_2 \div I_2$, where V_2 and I_2

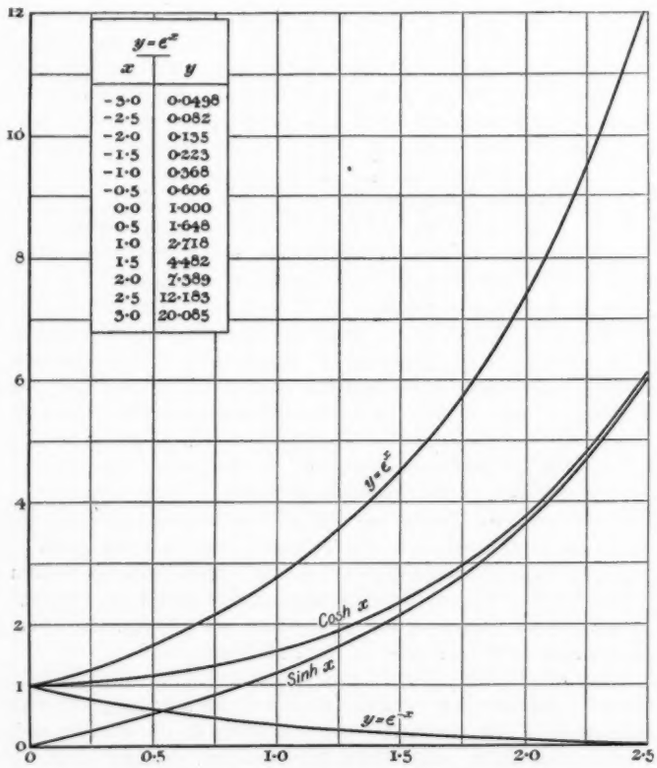

Fig. 2. Rising and Falling Exponential Curves.

are the voltage and current at the receiving end at which $x = l$, it is easy to see that we obtain the equations

$$V_2 = V_1 \cosh P l - I_1 Z \sinh P l \ldots\ldots\ldots\ldots (9)$$

$$I_2 = I_1 \cosh P l - \frac{V_1}{Z} \sinh P l \ldots\ldots\ldots\ldots (10)$$

Separating the variables and putting $V_2 = I_2 Z_r$, we obtain the final equations

$$V_1 = V_2 \left(\cosh P l + \frac{Z}{Z_r} \sinh P l\right) \ldots\ldots\ldots (11)$$

$$I_1 = I_2 \left(\cosh P l + \frac{Z_r}{Z} \sinh P l\right) \ldots\ldots\ldots (12)$$

These last equations enable us to find the values of V_2 and I_2 from those of V_1 and I_1 when we know the value of the complex factor in the bracket.

In applying the above formulæ (11) and (12) in numerical calculations in any given case, the chief difficulty which arises is that the addition, multiplication, and division to be carried out in reckoning the factor in the bracket are vector operations, and the quantities themselves, viz., Z_r, Z, $\cosh P l$, and $\sinh P l$, are complex quantities. If two complex quantities are

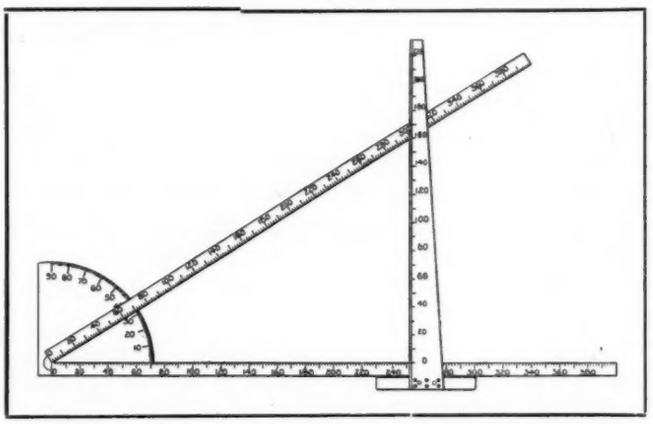

Fig. 3. Fleming Vector Calculating Rule.

given in the form $a + j b$, $c + j d$, it is an easy matter to add them, for their sum is $(a + c) + j (b + d)$. If, however, we have to divide or multiply them they have to be converted first to the equivalent forms

$$\sqrt{a^2 + b^2} \Big/ \tan^{-1}\frac{b}{a} \quad \text{and} \quad \sqrt{c^2 + d^2} \Big/ \tan^{-1}\frac{d}{c}.$$

These are troublesome arithmetical operations and require also a table of natural tangents. To facilitate this transformation, the author has devised a vector calculating rule made as follows:

Two boxwood scales about 1.5 metres long have their edges divided into centimetres and millimetres, and are hinged together at the zero ends. A quadrant protractor is attached to one rule so as to show at a glance the angle which the inner edges make with each other when the rule is opened (Fig. 3). A T-square, having one edge graduated in centimetres and millimetres, slides along one of the rules. Hence if we are given a complex quantity in the form $300 + j\ 400$, we can slide the T-square along so as to set off on one rule an intercept of 300 mm. We then open the rule so that the other arm sets off an intercept of 400 mm. on the T-square edge, and we see at once that the hypothenuse of the triangle is 500 mm. and the slope of the rule is $\tan^{-1}\frac{4}{3} = 53° 7'$.

By the aid of the rule we can then convert the expressions for vectors in the form $a + j b$ and $\sqrt{a^2 + b^2} \Big/ \tan^{-1}\frac{b}{a}$ into one another numerically with great ease.

To obtain the square root of a complex quantity given in the form $\sqrt{R + j p L}$ we have to convert $R + j p L$ to the form $\sqrt{R^2 + p^2 L^2} \Big/ \tan^{-1}\frac{p L}{R}$, and then take the square root of the size and halve the angle. Hence

$$\sqrt{R + j p L} = (R^2 + p^2 L^2) \Big/ \tfrac{1}{2} \tan^{-1}\frac{p L}{R}.$$

Accordingly when we are given the primary constants of a cable, viz., R, L, S, and C, and also p ($= 2\pi \times$ frequency, n),

we can calculate the value of the line impedance, $Z = \sqrt{R + j\,p\,L} \div \sqrt{S + j\,p\,C}$, by finding the vector expressions for $\sqrt{Im}$ and $\sqrt{Ad}$ as above and then dividing the size of the first by that of the second and subtracting the phase angles. The arithmetical operations consist in finding the numerical

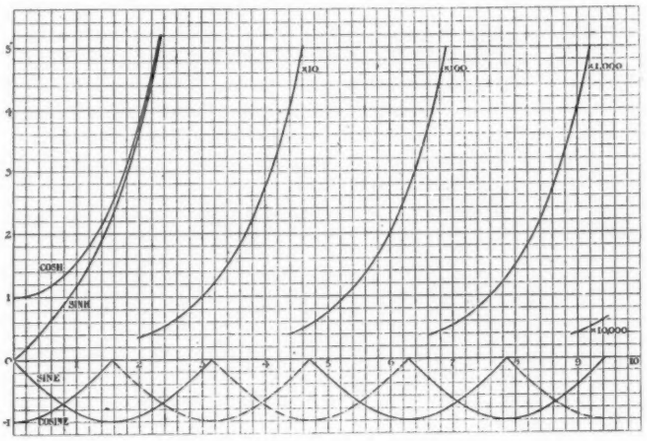

Fig. 4. Delineation of Circular and Hyperbolic Sines and Cosines.

value of $Z = \sqrt{Im} \div \sqrt{Ad}$ or of $\sqrt{R + j\,p\,L} \div \sqrt{S + j\,p\,C}$ and its slope, which is equal to

$$\left(\frac{R^2 + p^2 L^2}{S^2 + p^2 C^2}\right)^{\frac{1}{4}} \underline{/\tfrac{1}{2} \tan^{-1} p\,L/R - \tfrac{1}{2} \tan^{-1} p\,C/S}.$$

This is vastly facilitated by the use of the rule when only a moderate degree of accuracy is required.

Thus, if we are given the line constants of a standard telephone cable for which $R = 88$ ohms, $L = 0.001$ henry, $C = 0.05$ microfarad, $S = 5 \times 10^{-6}$ mho, all per loop mile, and if $p = 2\,\pi\,n = 5{,}000$, we find at once

$$Im = 88 + j\ 5 = \underline{88.1/3^\circ\ 15'};$$

and

$$Ad = \frac{5}{10^6} + j\ \frac{250}{10^6} = \frac{1}{4010}\ \underline{/88^\circ\ 51'}.$$

Hence

$$Z = \frac{\sqrt{Im}}{\sqrt{Ad}} = 593\ \underline{/42^\circ\ 48'}.$$

In these calculations, if one of the vector calculating rules is not at hand, a single four-figure table of squares and square roots and a table of natural tangents, such as that of J. T. Bottomley, will be found of great assistance. It is therefore quite easy to find the vector value of $Z_r \div Z$ or its reciprocal, when we are given the impedance of the receiving instrument and the constants of the line.

In the next place we have to find the value of cosh $P\,l$ and sinh $P\,l$. Since $P = \sqrt{Im} \times \sqrt{Ad}$, we can obtain the value of P at once in the form S/θ, and by the aid of the rule convert it to the form $P = \alpha + j\,\beta$. Thus, for the same standard cable $P = \sqrt{Im} \cdot \sqrt{Ad}$, or

$$P = \sqrt{\frac{88.1}{4000}}\ \underline{/46^\circ\ 3'\ 30''} = 0.148\underline{/46^\circ\ 3'\ 30''}.$$

Converting this back into the form $\alpha + j\,\beta$ by the aid of the vector rule, we find it is equal to $0.103 + j\ 0.104$. Hence $\alpha = 0.1$ and $\beta = 0.1$ nearly. If then the length of the cable is given, say 20 miles, we have $P\,l = 2 + j\ 2$.

We have in the next place to find the value of cosh $P\,l$ and sinh $P\,l$. These quantities are both vectors because $P\,l = \alpha\,l + j\,\beta$ is a vector.

Bearing in mind the exponential values of cosh x and sinh x and cos x and sin x as follows:

$$\cosh x = \epsilon^{x}/2 + \epsilon^{-x}/2, \qquad \sinh x = \epsilon^{x}/2 - \epsilon^{-x}/2,$$
$$\cos x = \epsilon^{jx}/2 + \epsilon^{-jx}/2, \qquad \sin x = \epsilon^{jx}/2j - \epsilon^{-jx}/2j,$$

it is easy to show that

$$\sinh(\alpha\,l + j\,\beta\,l) = \sinh \alpha\,l \cos \beta\,l + j \cosh \alpha\,l \sin \beta\,l.$$
$$\sinh(\alpha\,l + j\,\beta\,l) = \sinh \alpha\,l \cos \beta\,l + j\cosh \alpha$$
$$\cosh(\alpha\,l + j\,\beta\,l) = \cosh \alpha\,l \cos \beta\,l + j \sinh \alpha\,l \sin \beta\,l,$$

If then we are given the values of $\alpha\,l$ and $\beta\,l$, it is a simple matter to find the values of cosh $P\,l$ and sinh $P\,l$ from curves delineated in the chart (Fig. 4).

In these curves the author has graphically represented the circular and hyperbolic sine and cosine curves plotted in terms of radians as horizontal abscissæ set off along a base line. To distinguish the positive from the negative values of the circular sine and cosine, the parts of the curves which have negative values of the ordinates, are shown as dotted lines. The values from which the curves are plotted are given in the table. The hyperbolic sine and cosine are also plotted to the same arguments from the calculated values in the same table.

Since, however, these last curves rise up continuously, it is convenient to divide the ordinates by 10 as soon as the first branch of the curve reaches the top of the paper. When the second branch rises to a similar height, we divide again by 160, and in a third branch by 1,000. In this way we can plot curves for cosh x and sinh x up as high as cosh 9 and sinh 9 on squared paper of moderate size.

The curves as actually shown in Fig. 4 are on rather too small a scale to enable values to be read off with much accuracy. The reader can, however, easily re-draw the curves on good squared paper divided into centimetres and millimetres, on a larger scale, taking the calculated values from the table and drawing the curves in the manner shown in Fig. 4. This large scale chart will then enable the values of the functions to be read off to an accuracy of the second or third place of decimals.

Angle α in Circular Measure	Sine α	Cosine α	Sinh α	Cosh α	Angle α in Circular Measure	Sine α	Cosine α	Sinh α	Cosh α
0	0	1	0	1	5·0	−0·95895	0·28304	74·2032	74·2099
0·1	0·09983	0·99500	0·10017	1·00500	5·1	−0·92582	0·37797	82·0779	82·0140
0·2	0·19867	0·98007	0·20134	1·02007	5·2	−0·88346	0·46850	90·5333	90·6328
0·3	0·29552	0·95534	0·30452	1·04534	5·3	−0·83228	0·55436	100·167	100·171
0·4	0·38942	0·92106	0·41075	1·08107	5·4	−0·77275	0·63473	110·701	110·705
0·5	0·47943	0·87758	0·52110	1·12763	5·5	−0·70527	0·70854	122·344	122·348
0·6	0·56464	0·82534	0·63665	1·18547	5·6	−0·63128	0·77550	135·211	135·215
0·7	0·64422	0·76484	0·75858	1·25517	5·7	−0·55070	0·83470	149·432	149·435
0·8	0·71736	0·69671	0·88811	1·33743	5·8	−0·46482	0·88553	165·148	165·151
0·9	0·78333	0·62161	1·02652	1·43309	5·9	−0·37389	0·92748	182·517	182·520
1·0	0·84147	0·54030	1·17520	1·54308	6·0	−0·27944	0·96017	201·713	201·716
1·1	0·89120	0·45360	1·33565	1·66852	6·1	−0·18218	0·98325	223	223
1·2	0·93204	0·36236	1·50946	1·81066	6·2	−0·08310	0·99654	246·5	246·5
1·3	0·96350	0·26750	1·69838	1·97091	6·283	0·0000	1·0000	—	—
1·4	0·98545	0·16997	1·90430	2·15090	6·3	0·01679	0·99986	272·5	272·5
1·5	0·99749	0·07074	2·12928	2·35241	6·4	0·11652	0·99318	301	301
1·57	1·00000	0·0000	2·29930	2·50735	6·5	0·21510	0·97658	332·5	332·5
1·6	0·99957	−0·02920	2·37557	2·57746	6·6	0·31151	0·95024	367·5	367·5
1·7	0·99167	−0·12880	2·64503	2·82832	6·7	0·40480	0·91439	406	406
1·8	0·97383	−0·22728	2·94217	3·10747	6·8	0·49410	0·86941	449	449
1·9	0·94627	−0·32343	3·26810	3·41773	6·9	0·57842	0·81575	497·5	497·5
2·0	0·90936	−0·41619	3·62686	3·76200	7·0	0·65700	0·75390	550	550
2·1	0·86320	−0·50493	4·02186	4·14431	7·1	0·72897	0·68455	606	606
2·2	0·80845	−0·58858	4·45711	4·59791	7·2	0·79360	0·60836	670	670
2·3	0·74564	−0·66615	4·93690	5·09172	7·3	0·85042	0·52808	740	740
2·4	0·67537	−0·73743	5·46623	5·55695	7·4	0·89870	0·43886	817	817
2·5	0·59840	−0·80120	6·05020	6·13229	7·5	0·93799	0·34967	905	905
2·6	0·51542	−0·85694	6·69473	6·76900	7·6	0·96703	0·25130	997·5	997·5
2·7	0·42730	−0·90411	7·40026	7·47347	7·7	0·98811	0·15348	1105	1105
2·8	0·33396	−0·94275	8·19192	8·25273	7·8	0·99854	0·05400	1220	1220
2·9	0·23818	−0·97098	9·05956	9·11458	7·9	0·99894	−0·03593	1348	1348
3·0	0·14100	−0·99000	10·0179	10·0677	8·0	0·98936	−0·14548	1490	1490
3·1	0·04159	−0·99913	11·0763	11·1215	8·1	0·96900	−0·24353	1646	1646
3·1416	0·00000	−1·0000	—	—	8·2	0·93975	−0·33915	1820	1820
3·2	−0·05837	−0·99830	12·2459	12·2866	8·3	0·90220	−0·43136	2010	2010
3·3	−0·15734	−0·98746	13·5379	13·5747	8·4	0·85460	−0·51927	2223	2223
3·4	−0·25555	−0·96677	14·9654	14·9987	8·5	0·79852	−0·60200	2457	2457
3·5	−0·35090	−0·93643	16·5426	16·5728	8·6	0·73442	−0·67870	2711	2711
3·6	−0·44261	−0·89675	18·2855	18·3128	8·7	0·66295	−0·74860	3001	3001
3·7	−0·52900	−0·84810	20·2131	20·2376	8·8	0·58495	−0·81108	3316	3316
3·8	−0·61104	−0·79090	22·3394	22·3618	8·9	0·50102	−0·86542	3666	3666
3·9	−0·68710	−0·72657	24·6911	24·7113	9·0	0·41213	−0·91112	4057	4057
4·0	−0·75687	−0·65358	27·2890	27·3082	9·1	0·31911	−0·94770	4475	4475
4·1	−0·81834	−0·57474	30·1619	30·1784	9·2	0·22300	−0·97482	4947	4947
4·2	−0·87103	−0·49106	33·3357	33·3507	9·3	0·12447	−0·99222	5467	5467
4·3	−0·91620	−0·40271	36·8431	36·8567	9·4	0·02480	−0·99969	6043	6043
4·4	−0·95160	−0·30777	40·7190	40·7310					
4·5	−0·97752	−0·21080	45·0030	45·0141					
4·6	−0·99370	−0·11216	49·7371	49·7472					
4·7	−0·99992	−0·01240	54·9690	54·9781					
4·712	−1·0000	0·00000	—	—					
4·8	−0·99616	0·08748	60·7511	60·7593					
4·9	−0·98845	0·18649	67·1412	67·1486					

Table of Circular and Hyperbolic Functions of Radians.

Suppose, then, we require the value of cosh $(2 + j\ 2)$. We look out on these curves the value of cosh 2, sinh 2, cos 2, and

sin 2, which are the respective ordinates of the four curves to argument 2. We find sinh 2 = 3.63, cosh 2 = 3.77, sin 2 = 0.91, and cos 2 = — 0.42. Hence

$$\cosh (2 + j\,2) = -1.583 + j\,3.303,$$
$$\sinh (2 + j\,2) = -1.525 + j\,3.431.$$

The vector rule shows us at once that

$$-1.525 + j\,3.431 = 3.74 \angle 113^\circ\,45'.$$

If, then, the receiving instrument at the end of the line is a 60-ohm Bell telephone (receiver) for which

$$Z_r = 134 + j\,91 = 162 \angle 34^\circ\,15',$$

we find immediately that for 20 miles of this standard telephone cable, equation (11) becomes

$$\frac{V_1}{V_2} = (-1.583 + j\,3.303) + \frac{593 \mid 42^\circ\,48'}{162 \mid 34^\circ\,15'}\,3.74 \angle 113^\circ\,45'.$$

Now $593 \times 3.74/162 = 13.7$, and $113^\circ\,45' - 42^\circ\,48' - 34^\circ\,15' = 36^\circ\,42'$,

and $$13.7 \angle 36^\circ\,42' = 11.0 + j\,8.2.$$

Hence $$V_1/V_2 = 9.5 + j\,11.5 = 14.9 \angle 50^\circ\,30'.$$

Accordingly if 10 volts were applied to the sending end, the voltage V_2 at the receiver terminals would be 10/14.9 = 0.66 volt. The current through the telephone would be 0.66 divided by the telephone impedance, which is 162 ohms. Hence I_2 = 660/162 = 4 milliamperes. It will be seen, therefore, that for approximate calculations, such as may be necessary in getting out general specifications or predeterminations for proposed telephone lines, the vector rules and curves here described will prove very useful. When greater accuracy is required tables of hyperbolic functions of complex arguments, such as those recently published by Dr. A. E. Kennelly, through the Harvard University Press, will be requisite.

For preliminary rough calculations the use of the above described vector rule in conjunction with a slide rule immensely economizes time. The author has arranged with W. F. Stanley & Co., of Holborn, London, to make and supply this vector calculating rule. Since this paper was presented, the author has been informed that a very similar form of vector rule was devised by B. S. Cohen, of the General Post Office Research Laboratory, but never publicly described by him. He confirms, however, the author's statement as to its utility.

Improved Toll Speed in British Columbia.

Marked improvement in the handling of long distance telephone calls is reported on the system of the British Columbia Telephone Co., of Vancouver, B. C. This is said to have been brought about by improved equipment and as a result of the careful training of employes.

The average time between the receipt of calls and the commencement of conversation over toll lines has considerably decreased. On the New Westminster-Vancouver lines the average speed in 1913 was 2.1 minutes which has been reduced over the first six months of this year to 1.6 minutes. Only four-tenths of one per cent. of the calls are delayed more than eight minutes. Between Vancouver Island and the mainland an improvement of over 50 per cent. has been achieved, while the long distance calls on the island show an even greater improvement.

Bell Occupies New Building in Portland, Ore.

The Pacific Telephone & Telegraph Co. is now occupying in part its new 11-story fireproof exchange and office building in Portland, Ore. The new building is a class A steel frame, reinforced concrete structure, with steel doors and window frames and with wire glass in windows and doors, and all exposed openings. The building occupies a ground area of 100 feet square. On the north half of this space 11 stories have been erected; on the other half of the space the building has been temporarily constructed partly five and partly three stories.

The entire first floor will be utilized for the city business offices of the company, the sales and collection departments. Particular attention has been given to the arrangements so as to handle the public with the greatest possible dispatch.

On the second floor operators' quarters, rest room, cafeteria and library, have been provided. When completed there will not be a more modern or handsome cafeteria in the country, say the officers of the company. Food prepared in the cafeteria is provided for the operators at cost.

The third floor will be occupied by the new Broadway unit of the switchboard. This is already being installed, and will be in service approximately January 1. The division traffic offices are also on this floor.

The fourth floor is used entirely for rack, terminal and battery room for the board on the third floor. The fifth floor for the present is occupied by the offices of the division plant department, but ultimately will be an operating room.

The sixth floor is equipped for the operating school, and beside the necessary lecture rooms and offices, will contain a school switchboard upon which operators will be instructed and trained to enter the active service of the company. The upper floors of the building will be used for offices.

An American Diplomat's Telephone Grievance.

His Excellency Charles J. Vopicka, our minister plenipotentiary and envoy quite extraordinary to Roumania, Servia, and thereabouts, has filed complaint of the telephone service in the countries to which he is accredited. The circumstance which induced the fault-finding was peculiarly distressing, says George Harvey, in the August number of The North American Review. The minister had accepted an invitation to dine at the palace and was making suitable preparation, when suddenly and without warning his collar button leaped with characteristic nimbleness from its normal abode and zigzagged most aggravatingly into a crack in the floor under the bureau. Neither coaxing nor objurgation availing in the minister's attempt at recovery, he called up the queen for the purpose of informing her that he would be unable to be among those present. Although an adept in Roumanian speech, he could not convince the operator that his predicament justified calling the queen to the telephone, and international complications are feared unless Minister Stovall can induce the Swiss navy (!) to intervene.

Censorship of Foreign Telephone Talk in Paris.

Military restrictions against the use of any foreign language in telephoning still is operative and rigidly enforced in Paris, says a despatch from that city.

Americans are not, as a rule, known for their linguistic abilities. In speaking with friends they often, after a few words in imperfect French, lapse into their own tongue. Immediately they are interrupted on the wire with the curt instruction that the use of a foreign language is not allowed. Then follow protests and expostulations and finally the resumption of the conversation in French. It has sometimes happened that when Americans were talking in French laboriously and to the best of their ability, they have been told to cease speaking in a foreign language. Explanations that French was being used would bring an apology, but tinged with sarcasm.

The U. S. ambassador is an exception. Special orders have been issued permitting him to converse in English.

Public Relations of Utilities in Theory and Practice

"The Public Be Benefited!—Persuade the Public It Is Being Benefited!"—A Proposed Guarantee from the Public—Constructive Action Should Displace Obstructive Tactics—Forget Ownership and Remember Operation—Turning Attention to the Greater Good

By Public Relations Engineer

Will utility managers lose their hold upon their businesses if they fail to master that contradictory element in the public sentiment of today which assumes that business is best when profits are highest, while at the same time assuming that a utility is best when its rates are lowest? Can this apparent contradiction be mastered without showing that there is something more valuable for the so-called owner than the privilege of charging all the traffic will bear—and something worth more to the patron than the privilege of paying a less than cost rate?

What can be suggested as being worth more to the owner than all the traffic will bear? What can be offered to the user of service as being more valuable to him than free or less-than-cost rates? And, how may both producer and consumer be persuaded to prefer and to seek the more valuable object?

Justice More Valuable Than Unfair Advantage.

If utility owners might have an absolute guaranty of such just and reasonable annual return as the court of last resort would allow; and, combined with this, an absolute assurance or guaranty against loss of any portion of the price that the same court would approve as a just and reasonable *valuation*—would they not be "better off" than at present? If utility leaders were to unite in announcing publicly their willingness to accept the court's decision concerning these two items—the annual *return* and the *value* of their property and business—on the condition that this agreement on their part should be simultaneously protected by a thoroughly dependable guaranty from the public—a guaranty that every cent specified by the court as reasonable and just would be fully met, with interest or "returns" for every day that any portion remained unpaid after becoming due—would not their present opponents be put upon the defensive?

Could either a genuine or a counterfeit reformer, philanthropist or publicist justly complain? Could any utility leader reasonably hope to "do better" than this for those who are investors or speculators in utility shares? Could any utility patron honorably ask for greater advantage for himself? What else could be demanded for the public's welfare or the common good? Would not this relieve or relax the intensity of those patrons who object to private manipulation of public utilities on the one hand? On the other hand would it not also relieve or relax those owners who object to confiscation of private property for public use?

Are not all utility managers embarrassed and more or less confounded by reason of the fact that "no real leader can perform all the miracles or bestow all the benefits that candidates for leadership might promise to undertake?"

Constructive More Effective Than Obstructive Tactics.

When the writer was a boy on his father's farm, a neighbor sat for a day and a night with his shotgun across his knees, defying from entrance into his field of a surveying crew that was locating the line for a proposed railroad. Finally a sheriff and two buggy loads of deputy sheriffs took this farmer in charge. The railroad was built through his field, not at the price demanded by this farmer for the right of way, but upon the payment of an amount agreed upon by a board of appraisers.

The trouble with the farmer was that he had nothing of a constructive nature to offer. He was a mere obstructionist. Unless utility managers hit upon some better plan than the mere obstruction of a growing public sentiment, they will be overcome by the same forces that overcame the farmer's obstruction policy—the demands of the common good.

Opponents of the utility managers make a show of what professes to be a *positive* program. Make a show of what really calls for *action*. They act, themselves, and they call upon others to act. They have "a proposition to offer." They propose "reduction of rates," "increase of taxation," "improvement of service," "annulment or non-renewal of franchise," and "regulation" or "public ownership."

The utility manager is at a disadvantage as long as he is unable or unwilling to go any further than merely to object to any or all of these proposals. As long as his opponents keep him busy offering nothing but objections, they are proving that he is *not a leader,* for leaders do more than object.

The telephone companies, with which the author was associated, built and operated rural lines under the so-called "rental" plan. Rural patrons agitated the "mutual" plan until the company decided to sell the rural lines at a fair appraisel value and "switch" the lines after they became the property of the "mutuals."

Now, as long as the company's policy was a mere objection, the "mutual" agitation continued. But the agitation died out within six months of the day of the first announcement of the positive program of selling and switching. Those who had favored the "mutual" plan were called upon to shoulder responsibility for the performance of their promises, as soon as the company began to sell. After the sale of a very small number of the lines, the "mutual" enthusiasm died down by reason of the fact that the "mutuals" found elements of cost and elements of annoyance and work which had been left out at the time of their theorizing as to the cheapness of their plan.

Finally as a result of the company's bona fide desire to sell rather than "rent" at the original losing rate, the farmers voluntarily proposed that the "rental" plan be continued. They even went so far as to say they preferred it so much that they would pay more than the rate against which, only the year before, they had revolted.

A Positive Proposal.

Why not say, we could not prevent regulation if we would, and we would not prevent it if we could. We could not prevent the people from having public ownership if we would, and would not prevent them if we could.

But we will not be a party to an irresponsible and indefinite quarrel.

Therefore we propose: That those who want something for the future that is different from past and present practices, be given the best possible opportunity to get under the responsibility of demonstrating—in actual life—the "workings" of their persistent proposals. We are ready to sign an agreement with any portion of the public's govern-

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ment that is prepared to give to us ample security for the faithful performance of the obligations of the "party of the second part." We are willing to execute an agreement binding ourselves to accept as interest, dividends, or "return," such annual rate or amount as the court of last resort declares to be just and reasonable; the party of the second part to give the usual and customary amount of dependable collateral or other tangible security as a pledge that we shall not suffer one cent's worth of loss by reason of court costs or otherwise, from the yearly ratio of reasonable and just return, nor one cent's worth of loss from the reasonable and just value of the property and business, when the said rate and value shall have been finally determined by the court.

Where would the present utility annoyer get authority to make his "next move?" Would not this sort of a positive proposal be equivalent to saying to him: "It is your next move?"

The Cost of Irresponsible Annoyance.

After making the proposal here suggested, would not the utility manager be in a position to convincingly show that the irresponsible annoyer of utilities is becoming an increasing element in the cost of utility service? Would not the utility manager be able to lead the people to see that the utility annoyer is either stupidly or dishonestly proposing a plan, which, if accepted by the utility manager, could not be carried out by its originator?

Certain utilities have been managed contrary to the common good. This must be admitted. It is admitted so generally that even well intentioned but misguided men really think they are patriotic when they hit every utility head they can see "regardless of creed, race, color or previous condition of servitude." And, as long as utility managers do nothing but ask for exemption from trial, these utility annoyers find it convenient to insinuate that the deferring of the trial is proof of guilt.

The defect in the present policy of the average utility owner or manager is that his policy tends to convince the people that he, himself, fears that the dictates of justice and reason would give to his patrons a lower rate. As long as his practices have that effect his annoyers are relieved from the performance of their promises on the one hand, and raised in the confidence and esteem of the public on the other.

If utility owners and managers would promptly accept the challenge of their annoyers and issue a return challenge; if they would say: "Give us the public's guaranty against loss from the testing of your theories, and we will withdraw any and all objections"—then the utility annoyer would be "at the end of his rope." He would be unable to annoy any further and would have to act. He would have to get the public's guaranty against loss. He would have to raise public funds to pay the cost of getting the court's decision. In addition to this he would be under the immediate responsibility of "doing something" and under the necessity of persuading the public to shoulder certain important responsibilities. In other words he would have something more important to do than merely to find fault. He could no longer appeal to the public for its irresponsible assent to a pleasing fiction or theory. On the contrary he would be obliged to appeal to the public for action—for action that carries responsibility with it.

Leadership Versus Ownership.

It is our conviction that leadership is taking the place of ownership in the utility business; that no man, or set of men, will remain long in anything like practical or effectual control of any utility business by relying merely upon the old-fashioned owner's "rights" or "powers."

Neither private nor public "ownership" is a good thing to dwell upon. If the best possible operation of the plant, the best possible direction of the business and the best possible leadership of public sentiment in the direction of the common good, does not solve the problem, it surely cannot be solved by quarelling with irresponsible annoyers. There is nothing which tends to keep up the irresponsible quarrel more than a supersensitiveness about "ownership."

One extremist declares that private ownership of property is theft and another one declares that private ownership of property is privilege. Is not the truth to be found here, as always, in that golden mean which says there is no just ownership of property except that which is recognized as a responsibility to serve the common good? If that be true, what is the difference whether the ownership of a utility is called private and its creditors called shareholders; or public, and its creditors called bondholders?

In view of the present trend of public sentiment, of legislation and of court decisions—what has the so-called owner of a utility reason to expect, in return for his investment, that would be worth more to him than such return on such valuation as the court might declare to be reasonable?

Why not face these facts? Why not say that "regulation" is as necessary for the so-called owners of utilities as for their patrons; and, that regulation to be effective, must determine three things:

What constitutes a reasonable valuation of the property and business?

What constitutes a reasonable or necessary return for the additions and improvements, as well as for the property already in existence?

What premium or other inducement will secure the best sort of leadership or management?

Our conviction is that while each of these three is as essential to all the others as are the three sides to a triangle, it is the last that will afford the greatest benefit to the public.

It is our conviction that private operation will excel public operation—at least until we devise and establish in practice better methods of selecting and sustaining superior management or leadership at the hands of the public. Therefore, we incline to the idea that the utility man will succeed best when he relies upon his superiority of management and leadership more and upon his ownership privileges or rights less. In other words, when he remembers operation and forgets ownership.

Forget Ownership and Remember Operation.

The public will get the benefit it needs most, when it turns its attention to improvement of operation and forgets ownership. It has been said that a waste of 50 cents' worth of material or labor daily, on the part of each man employed directly and indirectly in the railway service and the production of railway supplies, would cost the patrons of the railroads more than a 5 per cent. dividend on all the capitalization that has ever been quarreled about between the people on the one side and the owners of the railroads on the other.

If the question of ownership could be forgotten while the *problem of economy and efficiency of operation* was being sympathetically considered by the public in general, as well as by the producers and consumers of the service, then public sentiment concerning the problem of ownership of public utilities might be relaxed and the more important as well as the more immediately practical matter of improvement in the methods of operation might become the principal object of the public's concern. On the other hand, if the matter of securing to the present owners, a reasonable equity in the utility which they have provided, could be given its merited place—if this matter of security could be properly placed before the public—the anxiety of the present owners might also be greatly relaxed.

The most extreme opponent of the private ownership of utilities must concede, we think, that, whereas, a *temporary* enthusiasm for public ownership and public operation might be aroused by the use of a rate so low that it would not provide for all of the elements in the actual cost of the service, it is undeniable that the *ultimate success* of a publicly owned and operated utility *depends* just as much upon the *permanent benefit* it is able to confer upon the public, that it depends just as much upon the manner in which it *serves permanently*, the common good—as does a privately owned and privately operated utility. The most bitter opponent of private ownership and operation, and the most enthusiastic advocate of public ownership and operation, must admit, we think, that *inferiority of management*—in the case of either a privately operated or a publicly operated utility—would be more injurious to the public, as well as more expensive to the patrons, *in the long run*, than an extra 5 per cent. yearly dividend to private owners.

The thing we suggest as being worth more to the owner than "all the traffic will bear" and worth more to the patron than a "less-than-cost rate" is the ending of that irresponsible quarrel which cannot be ended except as both will turn their attention from the lesser advantage and annoyance to the greater good.

How can attention be turned? That is the real task.

Standard Overhead Line Specifications in Arizona.

The Arizona Corporation Commission has issued an order which provides that all telephone, telegraph, signal, trolley, electric light and power lines, now or hereafter constructed within Arizona, shall be constructed and maintained in conformity with the specifications contained in the report of the commitee on overhead line construction of the National Electric Light Association. It is provided that all lines of aerial wires, or cables, of telegraph, telephone, signal and all other electric wires of similar nature, now or hereafter to be constructed across steam railroad rights of way, tracks, or lines of wire of the same classes, shall be constructed and maintained in conformity with the specifications applying to such classes of wires, cables, or lines, prepared by a joint committee and adopted by the Association of Railway Telegraph Superintendents, in convention at St. Louis, Mo., May 20, 1913. Modifications and additions to these specifications, made by the N. E. L. A., upon approval first having been made by this commission, shall be in full force and effect with relation to overhead line construction in the state. All telephone, telegraph, signal, trolley, electric light and power lines, now constructed in Arizona shall conform to those specifications, applying thereto, within a period of five years from the date of the order.

Telephone Numbers in Massachusetts.

Following memorandum has been sent out by the Public Service Commission:

"From time to time changes of number on party lines are made necessary because of the re-arrangements of circuits. At the request of the Massachusetts Public Service Commission, the New England Telephone & Telegraph Co. will hereafter give advance notice to all party line subscribers whose telephone numbers are to be changed. When such changes are necessary, all things being equal as regards facilities, preference will be given to subscribers who have had the use of certain numbers for a longer period of time."

Ring 'Em Again.

H. J. Sheets, Terre Haute, Ind., is building a new mausoleum in which he has ordered a telephone installed. Mr. Sheets does not explain his purpose, but says that he considers many of the modern burial customs brutal. From the average mud-draped grave to the beautiful telephone-equipped mausoleum is certainly an advance in courtesy to the dead. The question arises what shall be done if a subscriber calling this number gets the busy signal or hears the operator say, "Party doesn't answer."

A London Business Man's View of Government Telephones.

A correspondent of the Boston Transcript, J. P. Collins, writing from London, Eng., on "Horrors of Government Telegraph," quotes "one of our merchant princes, a man of wide business experience," as follows:

There is no case on record that I know of which more positively proves the rule that the government, state, city, or nation, should not undertake to conduct business, than the telephone system in England. Its telephone system under the previous and proprietary company was none too good; but it was conducted with a certain amount of business energy and ability. The very day that it went into the hands of the permanent officials of the government it dropped in efficiency, and for this there is very good reason.

The employee of the state or the city is responsible to no individual; neither is he encouraged by any individual when he does well. His salary is largely fixed, whether he does well or poorly, and it takes a remarkable man and one very rarely met with among government employes who retains his energy, his enthusiasm and his originality without any of those encouraging features. No one can dismiss these permanent officials, and the result is that they become, to say the least, extremely human, independent, and indifferent to criticism.

I feel that any government which undertakes to conduct the telephone business will do it more expensively, less satisfactorily, and infinitely less progressively than will a private company which is doing it for personal gain, plus the personal desire to do things well.

Fire Alarm Box System in London.

The telephone is being used with success in London suburbs in connection with the fire alarm box system. This telephonic device appears to be in advance of the system in vogue in most metropolitan suburbs of the United States which is somewhat surprising, considering the general condition of John Bull's telephonic service.

In case of fire one breaks the glass in the fire alarm box in the ordinary way. Instead of depressing a hook or pushing a button you lift up a telephone receiver and what is revealed as a door immediately above the glass, swings open the instant the glass is broken. Speaking directly into this little box above the shattered glass, you inform headquarters of the fire's location.

These sidewalk box telephones also are used for calling ambulance stations.

Municipal Demand at Jackson, Tenn.

The city council of Jackson, Tenn., passed an ordinance recently requiring the Cumberland Telephone & Telegraph Co., in the city of Jackson, to place all of its wires in the business district under ground. The Cumberland company had just completed an all cable distribution in the district, and was unprepared for this move on the part of the city council. It will cost the company a considerable sum to undo all the work that has already been done in addition to the cost of placing of conduits and cables underground.

Toll Service Controversy at Elkhart, Ind.

Service between Elkhart, Ind., and Union, Mich., was recently cut off because of controversy between the Home Telephone Co. of Elkhart, Ind., and the Central Union Telephone Co. at that city, on the one hand, and the Birch Lake Telephone Co. of Vandalia, Mich., operating the exchange at Union, Mich. The Elkhart companies, according to the Birch Lake company, demanded $15 a month for service into Elkhart, which the Birch Lake company refused to pay.

The Rejuvenation of the Craneville Telephone Exchange

A Serial Story Telling How a Rundown Telephone Plant Was Rebuilt, Enlarged and Changed Successively from a Grounded to a Local Battery Metallic System and Later to Common Battery —Problems Encountered by Every Practical Telephone Man

By Paul Hamilton

Mr. Rankin experienced a feeling of lonesomeness as he sat in his office the morning after the carpenters had completed removing the partition which had separated his private balliwick from the telephone exchange for so many years. To be sure, he, himself, intended moving within the next three or four

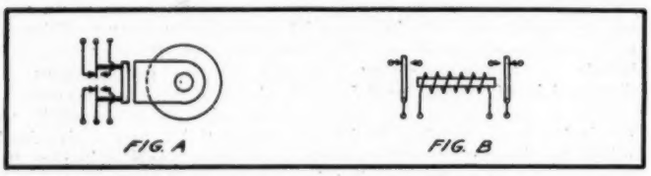


Fig. 135. Tension or Side Spring Relay.

months, but during the interval he did not relish being encompassed by an expanse of bare walls and floor.

"Blamed if I don't wish I'd have bought that old board and left her sit there," he mused. "I always considered the whole outfit a nuisance, but I reckon I'll miss the flurry and rattle for a few days. I presume I'll miss Kitty too. After all, I might have seen all along that she and the Doctor would pair off. She'll make him step lively some times, but he could have done worse. She's mighty liable to make a rich man of him, even if she is troublesome accordingly."

He slapped himself on the leg, jocosely exclaiming: "What's this, Pat Rankin! Prattling away to yourself like an old maid talking to her cat. I guess you'd better get out into the air," with which he strolled out into the street. Ten minutes later he found himself at the new exchange.

"Well, well! Barrows!" he exclaimed, "you've got some layout here, but I'll send that carpenter down and swing this door the other way."

"I hadn't thought of that, but I know it is quite inconvenient as it is. Since you are here, you may as well take this check for a quarter's rent."

Mr. Rankin scanned the check and returned it. "No," he said, "my understanding is that the lease on the old quarters is to run its time—that is two months yet, we'll add another month so as to start off here on the even quarter."

"But we are in here bag and baggage," Mr. Barrows protested. "Why not start new from today?"

"The other way suits me. The difference in rent isn't enough to matter. Got your insurance transferred yet?"

"Yes and no. I took the matter up with Mr. Gorkey, but haven't heard anything."

"I don't want to mix in, but I am not very busy, if you don't mind, I'll see Gorkey. Of course, I can't save you any money, but Gorkey is slow. It doesn't pay to let such things drag. Half the fires I know about happened just when there was some question about insurance being thrashed out.

"I never told you about Joe Martin's fire, did I? Well, I had a mortgage on Joe's place. It was all right and I was satisfied with it. One night just as I was going home, Kitty says to me: 'The insurance on Martin's place expired today noon. I have been trying to get Mr. Gorkey all day.'

"I went to the telephone and it just happened that I got him. I told him to renew the policy right away. I'm mighty particular about such things and had Kitty write him a letter that night. Somehow that letter didn't get mailed. That night Martin's two barns went up in smoke.

"Of course, Gorkey said I had no claim. The first adjuster who came down here said the same thing. Well, I didn't fool any longer with either of them, but went up to the office in St. Louis. Up there they took a different view of the case. They said that telephoning Gorkey, their agent, mind you, constituted a contract. So they paid the loss, paid Gorkey his commission and offered me my expenses for the trip. As I had other business in the city, I told them they needn't go that far. You'll be insured here before you leave tonight I'll see to that."

"Thank you. I knew that, in a general way, such contracts could be made by telephone, but I have not worried much about it."

"Maybe not, maybe not. It may be a hobby of mine, but every hoof and wheel I've got, is protected the minute I get an equity in it," said the liveryman. "But, say Barrows! What about this requiring a deposit before you put in a telephone? I've heard some complaints about it."

"I expected there would be some dissatisfaction, Mr. Rankin, but it's like this: We are going to install party lines under the rates which the council have approved. Here is a rate card:

Single party line, business	$3.00 per month
Two-party line, business	2.50 per month
Single party line, residence	2.50 per month
Two-party line, residence	2.00 per month
Four-party line, residence	1.50 per month

"Now this four-party and two-party line residence rate will appeal to a great many whom we may consider honest enough, but with no certain income or responsibility. Even when times are good, the collection cost is bound to increase over what it was before. Under our old method, a majority of our subscribers were thoroughly responsible.

"When we install a party line, each station represents an investment of approximately ten dollars. When conditions are

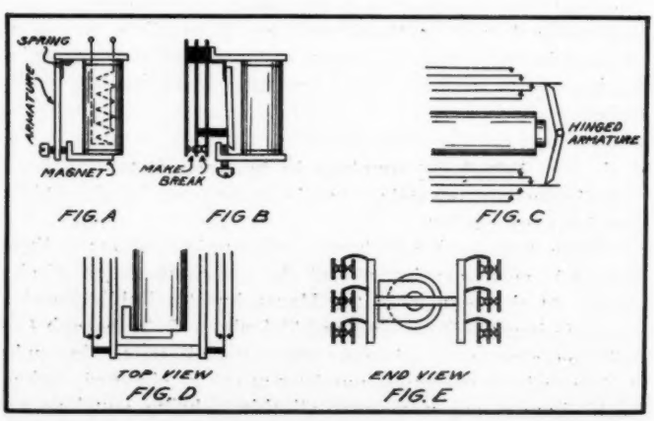


Fig. 136. Mechanical Action of Side Spring Relay—Special Relays.

uncertain as to the possibility of the subscriber meeting the terms of the contract, we demand a deposit of five dollars. It is the same precaution taken by the electric light company, except we agree to allow savings bank interest of three per cent. upon the deposits. Of course, we agree to refund the amount at the fulfillment of the contract."

"That is at the end of six months, you return the five dollars with interest?" asked Mr. Rankin.

"No, not unless the subscriber desires to cancel the contract at that time. You understand the transient element of Craneville has greatly increased since the factories have been located

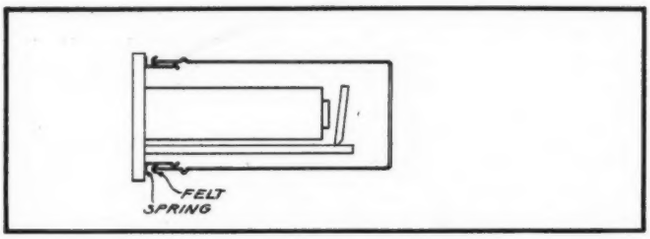


Fig. 137. Handy Type of Relay Cover.

here. There will be a great deal of moving from house to house and coming and going of temporary employes.

"You recall the electric light company enforced this rule even before conditions were as uncertain as they now are. The council approved the plan only upon the precedent of the electric company's franchise. It is just a simple business precaution.

"Here is an example right here before me. This fellow, Fred Kline, was here as it appears, to superintendent the construction of the canning factory. It was understood that he would be a superintendent or something of that sort, after the factory was in operation. Well, he moved away, owing us $2.67. I was talking with Carson, of the electric light company. They have a bill of $4.20 against him, but it is protected by a deposit of five dollars."

"I guess it is a good plan, but how about these newcomers "

"I am going to put that up to them. I have a blank form, here, which they can have filled in by some responsible party, preferably by people by whom they are employed. It is really a guarantee for the account, but a majority will prefer to make the deposit rather than ask any one to go their security."

"I guess it's all right. There are men I don't allow to take a horse from my barn without a deposit; and then, again, the grocerymen have got together and are asking security from the factories for some of the weekly accounts they are really forced to carry. I guess it all comes in the same class. It isn't over a year ago that I let a fellow have a team and he left it at Berkeley. He wrote me to get the team and he would settle next time he came here," said Mr. Rankin, and as if entirely satisfied with the interview, he left the office.

"I presume you boys are pretty tired tonight?" Mr. Barrows said questioningly, as Frank and Germany came in for the weekly conference?"

"One thing, the mosquito, he can't follow us in here," said Germany, who had been engaged during part of the day in screening the windows.

"I hope not," replied Mr. Barrows. "I believe in being as comfortable as possible, and screens are not a great expense. By the way, Frank, I wish you would come in for a talk with me in the morning. There are some things I wish to go over with you."

"All right. It's going to rain any way tomorrow."

"How do you know?" Germany inquired.

"By the way the kettle boiled tonight. My wife says the kettle boils quicker just before a rain. I don't know, but she most always hits it right."

"I try him," said Germany.

Mr. Barrows smiled and referred the question to the Doctor, who had come in as Frank was speaking.

"There may be a scientific principle involved. The barometer indicates varying conditions of the atmosphere. I believe there is a theory that there is a difference in the time required to boil water at sea level and at higher altitudes. The different conditions of the atmosphere, perhaps, makes a difference at different times. I hardly think it is noticeable though."

"All right," said Frank. "I'll take Annie's word for it, science or no science."

"I'll try him," Germany re-asserted.

"Well, let us go on with our relays. This drawing (Fig. 135-*A*) represents a self-acting or tension spring relay. This blueprint shows a recent development of the draftsman's art, and is a marked improvement over the style of representing this type of relay, used for so many years.

"In the old drawings you see two armatures represented (Fig. 135-*B*), one at each end of the core. The armature is also shown as a part of the circuit, although in fact the armature has no connection with the circuit. It is merely a lever controlled by the magnet; also the drawing shows two. There is only one and it is not at the end of the core at all.

"The mechanical part of the relay is like this (Fig. 136-*A*). You see the magnet is extended around to the side of the coil. The iron armature is fastened at the base of the coil on a vibrating spring which holds it away from the magnet. In some cases the pressure of the contact springs (Fig. 136-*B*) controls it.

"The advantages of the side spring relay over the gravity type are many. Its certain and uniform action permits very accurate and fine adjustment of the contacts, allowing one to break before another makes, as opening and closing them simultaneously. Another advantage is that the number of contacts operating from one armature is unlimited so to speak. I have seen a relay like this (Fig. 136-*D*) operating nine springs on each side; and still another like this (Fig. 136-*C*).

"Now about relays in general: There was a time, and the practice is continued yet in some instances, when each relay was fitted with an individual cover or cap, held in place either by a screw or nut. Thus every bank of ten relays had ten caps. Later in regular installations a tin cover was placed over the entire bank, but it was still held in place with screws. Unnecessary work was required to remove the individual covers, and this was only partially reduced by using one cover with three screws.

"Efficiency studies, I presume, discovered the simplest method for both individual and multiple covers (Fig 137), or the same as those in our board. To make these covers almost dustproof, a strip of felt is crimped around the base to lay between the cover and the mounting plate."

"Germany said that was to stop the 'click.' The Doctor said it was insulation. I didn't know," said Frank.

"Both very good reasons," answered Mr. Barrows. "It does prevent noise in replacing the covers, and lessens the jar against the frame. It also insulates the cover, but that is not a vital point as the relays are not supposed to come in contact with the cover. In handling these covers, be careful and not get them interchanged."

"They fit anywhere," argued Frank.

"I know they do, but you see each one is marked so you can readily find the relay you are looking for, as the relays are marked 0 to 9; that is each bank is so numbered. If the covers are interchanged, you are liable to work on the wrong relay and put it out of adjustment before you discover your mistake."

"There is dust inside the covers, already," said Frank.

"In that case, you had better take them off one at a time and wipe them carefully with waste or a soft cloth. A cloth is the better, for with waste small threads are liable to be left inside the cover, and cause trouble later. Keeping everything clean is a very important feature of maintenance. As I have explained, it is better to wipe up the dust than to blow it around from place to place. You may blow it from a place where it

is not causing trouble, only to have it settle where it will be an annoyance.

"In the course of a few days, I will want you boys to begin an inspection of each instrument. Those fellows who installed them did a pretty quick job, and you may find some defects which they overlooked. If you can come down tomorrow evening, we will go over the special circuits in the board and then take up the new instrument circuit in detail. I want to chat with the Doctor a few minutes and I don't suppose you boys will object to cutting our evening a little short tonight.

"All right," said Frank, "I'm willing. The mosquitoes are waiting for Germany outside anyway."

"Huh!" said Germany. "I smoke my pipe for him."

"Then I'll take the other side of the street," was Frank's reply.

"Here are some cigars," said Mr. Barrows as the two men moved towards the door. "Maybe you can smoke them and walk along in peace."

(To be continued.)

Organization of Ohio State Telephone Co.

Announcement has been made by S. G. McMeen, president of the new consolidated organization of Independent telephone companies in Ohio—The Ohio State Telephone Co., of a division of the territory into operating districts, and of the names of the officials selected to manage the properties. The new arrangement was made effective as of August 19. The notice, issued under that date, reads as follows:

Effective at once, districts of The Ohio State Telephone Co. are established, with territory of the original companies as shown below, and with the management as named:

Cleveland district: C. Y. McVey, general manager, Cleveland. Territory, that formerly occupied by the Cuyahoga Telephone Co.

Toledo district: O. O. Welsheimer, general manager, Toledo. Territory, that formerly occupied by Toledo Home Telephone Co. with its subsidiaries, Findlay Home Telephone Co.,and Citizens Telephone & Message Co.

Columbus district: G. R. Johnston, general manager, Columbus Citizens Telephone Co., with its leased property; Washington Home Telephone Co., London Home Telephone Co., and Lancaster Telephone Co.

Dayton district: A. W. Surrell, manager, Dayton. Territory, that formerly occupied by Home Telephone Co. with its leased property.

Stark County district: Adelbert Graham, general manager, Canton. Territory, that formerly occupied by Stark County Telephone Co., and Massillon Telephone Co.

Youngstown district: G. G. King, general manager, Youngstown. Territory, that formerly occupied by Youngstown Telephone Co.

Columbiana County district: D. G. Raley, manager, Salem. Territory, that formerly occupied by Columbiana County Telephone Co.

Zanesville district: J. B. Rhodes, manager, Zanesville. Territory, that formerly occupied by Zanesville Telephone & Telegraph Co.

Long distance division: Also, there is established the long distance division, comprising the toll lines of the United States Telephone Co., with such additions or deductions as may be made from time to time. Of this division, J. C. Boush is made general manager, with office at Columbus.

The general managers and managers named are to report to and receive instructions from G. R. Johnston, who is appointed vice-president in charge of operation. In this capacity his duties extend over all the property, with charge of the business, service and maintainence, and of the extension and improvement of the plants.

The office of assistant to the president is abolished.

In an accompanying statement The Ohio State Telephone Co., after naming the constituent companies included in the organization, says:

"The consolidated company owns and operates all the telephone exchanges heretofore owned and operated by the several companies named above. It also owns and operates the system of long distance lines practically covering Ohio and extending into the Independent telephone systems of western Kentucky, Indiana, Michigan, Pennsylvania, West Virginia and western New York.

The Ohio State Telephone Co. will improve and extend its service. It will provide the plant and the people to care for all the telephone business the public creates for it. And in particular the company hopes for a continuance of the public good will and support which its constituent companies heretofore have enjoyed."

Six Months' Earnings of Tri-State of St. Paul.

The financial statements of the Tri-State Telephone & Telegraph Co. of Minneapolis and St. Paul for the six months ended June 30, 1914, show the income from operations to have been $802,294 as compared with telephone operating revenues of $760,010 for the same period last year. The operation, maintenance and general expense was $433,909 as compared with telephone operating expenses of $361,040 for the first half of last year. The unappropriated balance this year after providing for all items of expense paying dividends, and applying $75,000 to depreciation reserve, is $43,027 as compared with $55,606 a year ago. The income statement and general balance sheet are as follows:

INCOME STATEMENT.

Income from operation	$802,294	
Income from sources other than operation	9,409	
Total income		$811,703
Operation, maintenance and general expense	$433,909	
Taxes paid and accrued	29,393	
Interest on funded and floating debt	35,415	
Reserved for doubtful accounts	8,020	
Amortization of debt discount and expense	5,207	511,944
		$299,759
Dividends paid on preferred and common stock		181,732
Balance available for surplus and reserves		$118,027
Applied to depreciation reserve		75,000
Balance unappropriated		$43,027

GENERAL BALANCE SHEET.

Resources.

Plant and equipment, including real estate and buildings	$8,147,584
Securities owned	491,100
Materials and supplies	104,284
Notes and accounts due from subscribers and affiliated companies	188,073
Cash	192,485
Other assets	41,662
	$9,245,188

Capital and Liabilities.

Common stock issued and outstanding	$4,000,000
Preferred stock issued and outstanding	2,201,880
Founded debt, assumed in the purchase of properties	1,199,750
Notes and accounts payable, including rediscounts	205,757
Due to common stockholders	159,000
Accrued taxes, interest, dividends, etc	174,187
Reserves	846,587
Surplus	415,000
Undistributed profits	43,027
	$9,245,188

How's Business?

The Effect of the War—War Loans—Local Financing

By J. C. Kelsey

In 1893, we had a very vigorous panic. Frederick Toppen, whom you never heard of, was the real leader—such is fame and glory. And it was a great panic, too. The weary years that followed it are still fresh in the public's mind. The panic ran its course, just as typhoid fever will run its course if left alone.

In 1907, we had another panic. This time it was J. P. Morgan who rushed over the remains of many failures, and took the leadership. That was a great panic, too. The weary years that followed are still fresh in your mind. The country has never really and fully recovered from the shock of 1907.

In August, 1914, we had another panic. Wall street was in its glory—for everything was going to the dogs.

Where was the leader who was to step forth and take charge? What were the long years following to be? Would we painfully emerge from the disaster and as slowly as we did in 1893 and 1907?

We found no leader in Wall street, and it seems that there will be no long, weary years of recovery.

Who and what was it that saved the day? Who was it that went to the rescue of Wall street so immersed in trouble? Who saved Wall street from its disasters? It was Washington. It was President Wilson and his cabinet.

How much better the government handled matters this time than private individuals handled them in 1893 and 1907. The private leaders did well. Of course they were limited by conditions. But the emergencies of 1914 far discounted those of earlier days, and no private leader appeared.

Why did Wall street fail to produce a leader? There must be a changed condition.

It is a well known fact that long, cold winters drive wild animals to the haunts of civilization. Knowing full well their danger, they seek out human aid—and take chances on it.

Just so a group of frightened financiers will lay everything at the feet of the man who is apparently the most able to bring order out of chaos. It was fear alone that made the stock exchange governors seek out J. P. Morgan and give him power over life and death. They made him Czar. And no man could do anything but obey his imperious will.

There is a changed condition. The new currency bill has taken great emergencies out of the hands of private individuals. Fear no longer rules the heart of finance; that is, that brand of fear or distrust of another group of men.

Each and every group of men simply fall back on Washington. And a wise president does the rest.

This is no argument for government ownership. It is merely a narrative of the value of government control of money matters. In other words, there are a few things which are too large for private individuals to handle—money particularly.

We heard a great deal of abuse of the currency bill, and of the sponsors of this bill. We surely have learned a great lesson.

As serious as the situation was, and is, our country is well fortified financially. So far, but 12 per cent. of the available emergency currency has been called out.

Just think of this! That a great panic could be stayed with but 12 per cent. of the funds of the government available. It is doubtful if private leadership could have done so well with all of it.

There was about $154,000,000 issued. Just to show you how the country is affected by the war, I want to show you where this fund was used.

The New York group used $98,000,000.
The Chicago group used $35,000,000.
The New England states used $9,500,000.
The Southern states used $8,800,000.
The Pacific states used $3,300,000.
The Western states used $180,000.

The group of western states comprised Kansas, Nebraska, Wyoming, Montana, the Dakotas, Colorado, New Mexico and Oklahoma. Nine states asked for $180,000! There are still $300,000,000 available for these states, and they do not want it.

What does this mean anyway? It was but a few years ago that these states were but desert communities. Today, with war in Europe, with the world in a panic, the middle western states ask for an average of $20,000 each of emergency currency.

Thanks to the help of the government, the effects of the panic have gone by more or less without permanent harm.

The ocean has been re-opened to the shipping world. This means that commodity exports are being made every day. We will be able to dispose of the great crops at good prices. Besides, the tourists are coming back. No man can do business with his family in hourly peril in Europe.

We are getting ready for a big business revival, the like of which has never before been equaled.

In the financing of the war in Europe, there seem to be examples of value to telephone men. Wars, just as telephone companies, must really be financed at home.

President Wilson has intimated that war loans to contending nations will be frowned upon. As we are about the only nation available for this purpose, it is going to make war finances a local issue alone.

England has already issued $75,000,000 notes—six months' paper at 3 per cent. Germany and France have also tried this expedient of local and temporary borrowing.

It will have a lasting effect upon the popular mind if money must be raised this way. It will bring the horror of war more closely to home. It seems that the pocketbook is more precious than the blood of young men.

Local financing will shorten the war. Soldiers must be paid. They must be fed. If there is no money available, the war must come to a close. It is true that the southern confederacy fought without money, but the circumstances of poverty had its effect.

It would be absurd for this country to sanction a war loan at the present time. No one knows a week ahead just what our problems will be. Inside of a month, we have felt the effects of war in Europe almost as much as if we were actually in it.

It is true that the Middle West knows little or nothing of it. They will feel only the prosperity of it. But elsewhere it is felt.

The war is only a month old, yet we have the problem of higher cost of living—it was once the high cost.

We have widespread unemployment. We will have war taxes, crippling of traffic, and other kindred evils.

The money is needed at home. The American public has no right to subscribe to war loans. Let them use this money to build enterprises to manufacture here what was once bought elsewhere. Let them invest this money in local enterprises—with every guarantee of success.

We have many reclamation projects to work on. We have more railroads to build. We must have more telephones. Think what could be done if the proposed French loan of $200,000,000 were applied to the walks and ways of peace.

The effects of the war have been felt in the telephone business, yet in a relatively small way. The closing of the stock exchanges naturally hurt the leased wire business.

American Telephone does a big leased wire business, yet it is hardly more than 1 per cent. of the gross receipts of the company. If continued for a year it will be quite a loss of revenue, but not enough to hurt. Contrasted with the loss of the leased wire business, there comes a visible increase in long distance earnings.

There is no decrease in the rental list. No rate will be reduced and, better still for the public, nothing will be increased.

In many ways, the telephone is a very unwieldly thing. It goes along in the even tenor of its way. It cannot take advantage of emergencies and is only hurt by its own losses. The losses of others have no effect.

In war, in peace, winter or summer, it follows the line of the previous year with slightly increasing deviation. No better bond or stock exists.

There never was a better time to prepare to look into telephone finances. There never was a better time to put the telephone house in order. Today is the time to get ready to take your subscriber into your confidence.

You will soon be able to raise your rate without protest. The state commissioners have been in long enough to realize your necessities. You have no excuse to delay the exercise of your rights.

Only last week, the New York commission gave the Federal company, of Buffalo, the right to increase its gross earnings over $150,000. It approved of the company issuance of 7 per cent. preferred stock. Can you imagine a better condition from the investor's standpoint?

Here is a utility, its existence approved by a governing body appointed by the state. This governing body has gained in experience.

After several years analysis, it knows the good and the bad. It knows not only of the actual existence of the telephone comany, but also of its utility and usefulness.

Knowing this, it gives the utility the right to adjust its rates so that the public must pay for service rightfully rendered at its proper value. And it governs the issuance of the securities against the property so that the public is protected against security watering. In other words, under commission control, the security buyer knows that he is buying a scurity founded on real property and having unfailing returns.

How many security buyers know this? And have you, as a telephone man, given any thought to the sale of your securities? Have you, as a telephone man, worked your way up to success without knowing that you had something to share with the public?

There is really no excuse for a poor telephone company. Every one should earn properly. It is your fault if they do not.

The state has provided a way for you. If you do not accept it, then no one is to blame. You have a business which is unique. Your principal liability is new business.

It is a business which drives you on, and it never grows less. No community exists today that does not need more telephones, and is willing to pay for them. Get ready for your harvest.

In connection with stock watering, there is a story which concerns Gould, Vanderbilt and Daniel Drew. Daniel Drew was originally a stockman.

He drove cattle to the New York market when that place was a village. When he started out, he would give the cattle all the salt they could eat. Then he would drive them all night and before reaching the market place, would stop at a watering place—to let the thirsty cattle drink themselves to the limit.

So it came to pass that stock watering came into existence. It surely died hard.

Speaking of Vanderbilt and his famous exclamation, "The public be damned!" it seems that a delegation of New York Central commuters wanted an innovation.

They told Vanderbilt that the Pennsylvania railroad was doing the same thing for the public. Vanderbilt said, "The public be damned! The Pennsylvania is doing it for its own good."

It is apparent that this statement was purely local, and all that Vanderbilt meant was that the Pennsylvania Railroad did not care anything about the public. It is easy to be misunderstood.

But there should be no misunderstanding to the thinking telephone man. Your business has been approved of. Your probation is over. You are a seasoned utility.

Your problems are understood, and your needs are known. You have no watered stock—and you have never been in "the public be damned!" class.

When people talk of war loans, you talk of loans to local enterprises. Put your securities in such shape that the public can buy them without inconvenience. Even Wall street is getting down to $10 and $100 denominations.

I think every telephone company employe should encourage the sale of good telephone securities in his home locality. Sometimes your neighbor can see better in your town than you can. You go over there and you can sell better than your neighbor can.

But the time is not far away when the local telephone company should have security market practically all to itself. Think about it, Mr. Telephone Man, even though it is dog days.

Now is the time for all telephone men to come to the realization that their time of probation is over, and they stand approved.

What Buffalo has done, you can do. It is a grand achievement, and a fitting reward to years of untiring effort in behalf of the public. Unlike Wall street, we have never depended upon leaders, and have gone our own separate ways. Even in great crises, our business goes on in its unruffled way.

MORAL: Vanderbilt did not mean it.

Instructing Subscribers How to Talk Over the Telephone.

The Central Union Telephone Co., of Indianapolis, Ind., is issuing a little booklet entitled "Talking Over the Telephone," as a means of urging subscribers to co-operate with the operators. The book contains sixteen pages of instructions to the subscribers, explaining how to obtain the utmost from their telephones, in the way of service.

Practical Subjects—Letters and Discussions

The Value of Efficiency Circles.

The "Efficiency Circle" is the name of an organization of the employes of the Petroleum Telephone Co., of Oil City, Pa., which is attracting favorable attention from managers of telephone companies in some of the surrounding cities because of the good work it is accomplishing. The Efficiency Circle is composed entirely of employes and is for the purpose of bringing about full discussion and consideration of the betterment of the service and greater efficiency in all branches of the telephone company's work. Monthly meetings are held in each city in which an exchange of the company is located, and a quarterly or general meeting of the entire group is held on a more elaborate scale.

At the recent quarterly meeting of the organization in Monarch Park, Oil City, General Manager W. S. Paca delivered an address of welcome on behalf of the company and expressed the pleasure the officials felt at the meeting and the progress that has been made. Addresses were delivered by W. A. Neeley, of Oil City, president of the Circle; H. R. Pope, of Franklin; and Fred J. Havens, service engineer, of Pittsburgh. This was followed by a fine banquet in the park cafe, with plates set for 70, following which was a dancing party at which the young lady employes were allowed to invite their guests. Fully 150 couples enjoyed the dance

Group at Meeting of "Efficiency Circle" at Oil City, Pa.

program and about 350 spectators are estimated to have been present. An interesting combination menu and dance program, the latter having some of the dances designated by telephone terms, was published for the occasion.

It is said that as the result of the successful formation of this Efficiency Circle, others are springing up among telephone companies elsewhere, notably at Erie, Pa., among the employes of the Mutual Telephone Co. There is no doubt that organizations of this kind among employes may be made a means of considerable benefit to the service and General Manager William S. Paca makes the suggestion that other telephone companies form efficiency circles among their employes, so that a meeting or convention might be held, say annually, at which delegates from various circles could be present and thus give companies in various parts of the country the advantage of exchanging ideas pertaining to operating, maintenance, construction and the work of the commercial department. It is hoped, at any rate, to have a convention of delegates from efficiency circles organized in Western Pennsylvania.

A Colorado Telephone Family Group.

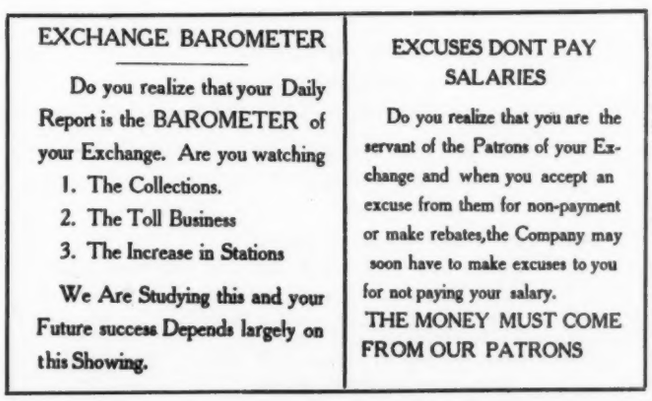
O. J. Stone, secretary of the Delta County Co-operative Telephone Co., of Paonia, Col., which company operates exchanges at Cedaredge, Crawford, Delta, Eckert, Hotchkiss and Paonia, has favored TELEPHONY with a photograph showing the telephone company's big and cheerful family. This picture, which is reproduced in the accompanying illustration, was taken on the occasion of the first annual picnic of the company at Fair Park,

Operating Force of Delta County Co-operative Telephone Co.

Hotchkiss, Col. Mr. Stone says that the young ladies who are not married think they are good looking enough to appear on a page of TELEPHONY. If the illustration tells the story as well as the photograph itself, it will no doubt be conceded by our readers that good looks predominate in the two front rows at least.

Some Aphorisms That Keep Things Moving.

The value of time; the worth of character; the improvement of talent; the virtue of patience; the power of kindness; the success of perseverance; the joy of doing work; the beauty of simplicity; the influence of example; the power of tact; the wisdom of economy; the obligations of duty; the pleasure of initiative and numerous other things right along the same line, are considerations that are kept uppermost in the minds of Independent telephone employes, in the vicinity of Waco, Texas. General Manager P. Kerr Higgins, of the Texas Independent Telephone System, is well known for his original and virile methods of reminding


EXCHANGE BAROMETER
Do you realize that your Daily Report is the BAROMETER of your Exchange. Are you watching
1. The Collections.
2. The Toll Business
3. The Increase in Stations
We Are Studying this and your Future success Depends largely on this Showing.
EXCUSES DONT PAY SALARIES
Do you realize that you are the servant of the Patrons of your Exchange and when you accept an excuse from them for non-payment or make rebates,the Company may soon have to make excuses to you for not paying your salary.
THE MONEY MUST COME FROM OUR PATRONS

Samples of Dodgers Sent Out to Exchanges.

employes of the qualities of mind and character that he expects to see made manifest in the big business family of which he is an official member.

Some of the reminders, or rather stimulators, which go out to exchange managers in Mr. Higgins' mail, and some of the small placards which are supplied by him for posting up in exchanges, are shown in the accompanying

illustrations. The following terse reminder of what is expected at headquarters, is printed in boldface type upon pink paper and upholds the standard of efficiency in collections:

WE HAVE EMPLOYES TRAINED

Waiting to fill the position of managers who can't get the money due us.

Better get busy if you are not getting in the money. We will investigate and find the cause, which is one, or all, of seven things:

1. Bad service.
2. Bad maintenance.
3. Bad judgment.
4. Bad management.
5. Bad treatment.
6. Laziness.
7. Neglect.

If people can't afford to pay for service we can't afford to give service.

Another talk, on the subject of telephone courtesy, is as follows:

When you answer the telephone be pleasant. It costs you nothing and in your heart you want to be well liked.

As you take down the receiver say "Telephone company," then your department; it saves time. Said pleasantly, it is a splendid recommendation and advertisement for yourself and the company.

Thank the man or woman who helps you or gives you information; they like it. Remember, on the telephone, voice is everything; let it sound "Welcome."

Distance should make the voice sound kinder.

The pace set for the individual employe of the Texas Independent Telephone System's organization is fittingly set forth in boldface type on a white card, as shown below:

THE WORKER

A Business Problem

Some Stepping Stones to it's Solution

1st. Do what you are paid for and then some.

2nd. Care for the Companies' property even more than your own.

3rd. Be on the job at all times.

4th. Plan, study and work for the job you think you ought to have.

5th. Study every problem and find the answer.

6th. Profit by the experience of others; don't make the same mistake twice.

7th. Think lots, talk less, study more, work hard.

Better Wear Out Than Rust Out.

The foundation on which a successful telephone exchange is built is disclosed to be:

1. Uniform courtesy to everyone.
2. Giving high grade service.
3. Prompt and permanent repairs.
4. Care of equipment, supplies and premises.
5. Prompt payment of bills due patrons and company.
6. Cost of service.
7. Prompt, accurate reports.
8. Increasing number of patrons.
9. Success in holding patrons.
10. Suggesting frequently how the company can increase it's business at fair profit.
11. Cleanliness of exchange quarters.
12. Saving lost toll calls.
13. Eliminating waste of supplies.
14. Co-operation with each other and the company.

SERVICE FIRST

Means higher efficiency, greater developement, better collections and advancement of employes.

Be Slothful and the Glooms Appear,
Be Busy and the Joys Appear.

P. K. HIGGINS

Watching The Clock

The Time Clock is Limiting the Possibilities of Some People. Are You one of Them?

Time Wasted is Gone Forever.

P. K. HIGGINS

To Avoid Unkind Criticism

1. Say Nothing
2. Do Nothing
3. Be Nothing

Some Placards for Telephone Exchanges.

London Subscribers Complain of Ear Shock.

The postmaster general of Great Britain gives London telephone subscribers credit for having sufficient intelligence to avoid disagreeable features of the government telephone system, judging from his printed answer recently issued to queries as to whether he was aware of the fact that new instruments used for telephoning were causing ear trouble among subscribers. It seems that the electric currents are now producing a disagreeable click and it is claimed that patrons of the system are getting partially deaf as a result of the trouble. The postmaster general says:

"In the more modern telephone exchange systems, stronger electric currents are used than formerly, in order to obtain quicker communication and clearer speech. The drawback to these systems, which are worked on the central battery principle, is that if the receiver is kept too close to the ear at the moment when the current is turned on or off, the resulting click of the diaphragm is disagreeable. Subscribers soon learn, however, not to put the receiver close to the ear while communication is being established or broken."

The majority of the principal exchanges of London use the central battery system.

Danger Arising from Tacks on Poles.

J. D. Gordon, plant supervisor of the Central District Telephone Co., at Wheeling, W. Va., has called attention, in a public statement in a local newspaper, to the danger to linemen from the presence in telephone poles of the iron tacks used to tack up notices. The statement says:

I would like to appeal through the columns of your paper to the various candidates for county and city offices, asking them not to placard the poles of the telephone company with announcements of their candidacy.

The telephone company's only interest in this entire matter is the saving of some of our linemen from serious accidents. This company has had some very serious accidents to its linemen due to the men's spurs, when climbing poles, slipping on the iron tacks with which these placards are fastened to the poles. This causes the linemen's spurs to cut out and we have had two men in this district who have been crippled for life, on account of falls from the poles, due to this cause.

The company absolutely prohibits the placing of its own signs on its poles for this reason, and we hope that the publication of this letter in your columns will cause the candidates to refrain from using our poles to place their cards on, and thereby avoid seriously crippling some of our linemen in the regular performance of their work.

Effects of the War on Telephone and Telegraph Service

Censorship of Telephone Service in England and France—The Foreign Telephone Service As Indicated by Reports Reaching this Country—Effects of the War on the Business of the World's Telegraph and Cable Companies—Comments by "Telephony's" Correspondents

A modified form of censorship has been established over the telephone system of Great Britain, due to the war, writes a correspondent of TELEPHONY in England. No one is allowed to speak except in English, and those attempting to use any other language are at once cut off.

We learn here in London that the martial law of Paris has now affected the telephones there. With a view to preventing the leakage of dangerous news, the French authorities are carefully tapping all telephone calls, which can now only be carried on in French. It is believed Germans are in the habit of telephoning in English. Britans and Americans whose knowledge of French is limited, are handicapped by this new regulation. Mr. Herrick, the United States Ambassador to Paris, was cut off while attempting to converse with a friend in English.

PRECAUTIONARY STEPS IN LONDON.

Remarkable activity of government servants in and around London among German telephone subscribers is taking place. The first step in the precautionary measures taken by the British government was to cut off all telephones of German subscribers in London. This disconnection has resulted in the "death" of an astonishing number of telephones. "German spies" are directing much energy in and around London toward the destruction of telephone wires. In several instances poles have been burned down and communication between important points, from a British point of view, has been interrupted. The government is keeping telephone repair men on watch at isolated exchange points and country post offices, but despite their precautions outrages are continuing and the territorials, the "coast defense force," have been detailed in some cases to watch for offending foreigners.

A reader of the London Times suggests that since telephones are national property they should be made the vehicle of conveying to the nation, by means of notices posted in the provincial exchanges, any news of interest during the war. The correspondent suggests further that official statements should be telephoned to head exchanges and thence distributed to the smaller ones. He says in this way dwellers in the country would be saved much "weary waiting."

Telephones, even in London, are proving their worth in time of the present international calamity, home, foreign and provincial agencies of the big dailies, now relying on the telephone with which to spread the thrilling war news daily at hand. In the premises adjoining the admiralty in London, the government has just installed a new press bureau, from which all naval and military news during the present European conflict will be given accredited representatives of the press here. Adjoining the room in which the news will be handed out in bulletin form, is one containing a number of telephone boxes for use specially by foreign agencies and London and provincial papers. Other boxes are being hurriedly added. A special staff of operators will be kept at an exchange to which the telephones will be connected. Passes issued by the censor's department will permit of only journalists using the telephones.

The postmaster general announces that during the war, a digest of telegrams from the admirality and war office press bureau will be distributed at telephone exchanges every Sunday morning, to be available for callers and subscribers.

In connection with his report TELEPHONY'S correspondent, who is an American, writes:

"I was held up by police officers today, while getting pictures of London telephone alarm boxes for fire and ambulance calls. A railroad arch being in the vicinity, I was charged with having designs on the country's safety. After much inconvenience I was able to convince the authorities I am not a German spy. Even a police permit from one division would not benefit one much in a strange neighborhood, so wrought up is the country just now."

NEW YORK VIEW OF SITUATION.

The condition of telephone systems in foreign countries, from information that can be obtained in New York, is such that the public has little access to exchanges. The service has been taken over by the war and other government departments for exclusive use in distributing orders, information, etc., incident to military operations. In all the foreign countries the telephone systems are operated by the government and the matter of withdrawing the use of the telephone from the public presents no great difficulty.

A prominent telephone official of New York City, recently returned from Europe, stated that he understood that in several of the belligerent countries the public has partial access to telephones but under conditions of censorship as rigid as those governing the operation of telegraph lines. He was of the opinion that all calls must go through a censor who listened in, and in some cases messages could only be transmitted when presented in writing at the telephone department of the postal service. In both cases the language used must be the language of the country and plainly spoken or written.

In the case of countries nearest the actual war zone the understanding is that the telephone service is practically prostrated. Many exchanges are totally closed, while others are merely kept open for official purposes. It is assumed that the operation of telephone systems in some of the warring countries has been largely interfered with because of a depletion in the ranks of employes coming with the drafting of reservists in the various armies.

THE GOVERNMENT OWNERSHIP ASPECT.

Telephone authorities in this country before expressing an opinion as to foreign conditions prefer to wait until more detailed information is received as to just what service is being given. Whether the attitude would be taken here that under conditions of government ownership abroad the interests of the public are not reasonably considered and that the withdrawal of telephone service is wholly peremptory or whether the other view would be taken that the government was greatly benefited in being able to withdraw the telephone service from the public and concentrate its use for war purposes, cannot yet be determined. There is a general impression, however, that those who argue against government ownership will not find a great deal upon which to base a sound debate. This is merely because the questions involved, comprising as they do conditions peculiar to each individual country, could not be made applicable to any situation that might obtain in this country.

For instance, in foreign countries practically all active males are pledged to the service of their country in times of warfare as reservists and, as in the case of the present conflict, are called to the front. This results in an immediate

effect upon business generally not likely to be encountered in this country in case of war. It would mean the placing of the telephone, as a business accessory, in a totally unimportant place—with business at a standstill. Furthermore it would have its direct effect on the telephone business in that many employes would be compelled to join the armies. The fact that the telephone does not fill as important a place in the scheme of things abroad as it does here, also should be considered.

A prominent eastern telephone man told the New York correspondent of TELEPHONY that if he were so inclined he might find in the present situation as regards telephones abroad, an argument against government ownership—not in the fact that the various military offices have taken over the services, which, he states, is perfectly natural and justifiable—but in the tie-up of capital involved in the closing of so many foreign telephone exchanges.

In the German Empire telephone investment is estimated at $232,537,000; in Great Britain, $131,309,000; in Austria, $34,060,000; in Hungary, $14,580,000; in Belgium, $16,163,000; in Finland, $2,820,000; in Russia, $30,336,000; in France, $75,380,000; and in Servia, $630,000. The total telephone investment involved, therefore, in the warring countries is $537,755,000. In all these countries the telephone systems are owned by the government exclusively, except in Russia and Finland, where there are government and private systems.

EFFECTS OF WAR ON TELEGRAPH AND CABLE COMPANIES.

Telephone companies and telegraph companies while competitive, and, as regards operating conditions, sometimes wholly similar, are widely separated when it comes to the effect upon their service and operation from a general warfare. Telegraph companies have been enjoying a large increase in cable business since the various declarations of war abroad, writes TELEPHONY'S New York correspondent. This has been caused to a great extent by the flood of messages sent by stranded Americans on the Continent and in England, and by increased press messages. One authority has expressed the opinion that this has represented to the cable telegraph companies a gain in gross business of fully 50 per cent. The rush of messages almost up to the present time has been so great as to result in much congestion and uncertainty. It can be seen, therefore, that confining consideration to message service of this character the telegraph companies have reaped a harvest outside the swath of the telephone companies' reaper.

But to go further, messages of such character could only be temporary. In addition, the belligerent governments lost no time in establishing rigid censorships, so strict, in fact, as practically to paralyze service and to cause great uncertainty and delay. But, most important as an unfavorable feature encountered by the telegraph companies, is the possibility of destruction of cables by warring nations. Already cables into Germany have been cut. There is practically no telegraph service to European countries east of France.

These are conditions not at all affecting telephone companies in this country.

To consider American telephone supply companies, the effect of the war upon them is negligible. There are very few doing an export trade of any magnitude. They are only affected in so far as the development and improvement work of American telephone companies is retarded by business depression. This would mean a drop in sales, of course.

An exception is the Western Electric Co., which has factories or closely affiliated relations with manufacturing concerns in practically all the warring countries. It has factories in England, France, Germany, Belgium, Austria, Russia and Japan.

"We have been notified," said H. B. Thayer, president of the Western Electric Co. "of the closing of our Antwerp and Paris factories. I do not know whether this was caused by the cessation of demand for telephone supplies in France and Belgium or by the employes of the factories going off to war. We have received only meager information here and can only guess as to just what the situation is.

"We have received no word from Berlin, where we have a factory, but we assume that this is closed. Off hand, I should say that there were about 2,000 men employed in both the Antwerp and Paris factories, and about 600 in the Berlin factory.

"We have been unable to get word to or hear from the factory in Austria, or that in Russia. In fact, there has been no information forthcoming from our places located east of France. We assume that the Austrian plant is closed and that the one in Russia has also shut its doors. Now that Japan has joined the war, our Tokio plant may be similarly placed.

"Foreign telephone supply companies are, of course, greatly affected by the war, by reason of having the various governments as their sole customers. At this time the governments are not spending their money for telephone supplies; they are putting it into war material. At any rate the purchase of telephone supplies would be secondary to other purchases under the head of necessities.

"We understand that there is little attempt on the part of foreign governments to keep up telephone service at this time. The Antwerp telephone exchange is closed and I presume the Paris and Berlin exchanges are no longer open, although I have received no information to that effect.

"Of course, the re-opening of our foreign factories is dependent upon the length of the war and the effect of the war. I would not care to go into the matter of the financial loss involved, which, of course, is considerable, with the plants entirely idle. The Western Electric Co. here, however, is distinct from the foreign factories; its finances being carried separately. The foreign factories are run by their own individual companies, with which the Western Electric Co. here is closely affiliated. This is the case because foreign governments will not purchase telephone supplies from companies not employing native labor.

"The condition of foreign factories before the outbreak of the war was excellent. All were doing large business, and the prospects for the future were bright.

AMERICAN TELEPHONE SUPPLY COMPANIES NOT AFFECTED.

"I do not believe the Western Electric or any other telephone supply company in this country will feel to any great degree the effects of the war. This, however, would depend upon the condition of the telephone business, which might be somewhat adversely affected by general business conditions.

"I do not know of any American company doing an export business of any size, although there may be some. The Western Electric has some export trade, but it is negligible."

Mr. Thayer did not care to state what amount of business was done annually by the foreign factories, and just what effect the closing would have upon the Western Electric Co. The statement for the year 1913 of the Western Electric Co. showed sales amounting to $77,532,860, but these did not include sales by foreign affiliated companies. However, as the control of the Western Electric Co. is in the hands of the American Telephone & Telegraph Co., the loss will be to the latter company, and will doubtless show in the statement of that corporation.

From another source it was learned that previous to the war, the Western Electric Co.'s foreign factories were doing a business which, considering the size of the plant, was proportionately larger than business being done by the American company.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities and Actions of City Councils Bearing Upon Franchises, Rates and Service

California Commission Order on Inductive Interference.

The California Railroad Commission has issued a general order to the power companies of the state regarding inductive interference. This order is based upon the exhaustive investigation of a committee which will present its formal report at the Pacific Coast convention of the American Institute of Electrical Engineers, to be held at Spokane, Wash., September 9 to 11. The order differs from the recommendation of the committee in being retroactive, affecting past as well as future construction. It provides for avoidance of parallelism between power and communication lines when possible and for care in making transpositions. In any power circuit involved in a parallelism no grounded single-phase or grounded open-star transformer connections shall be employed, the use of air switches is practically prohibited and deviations from a pure sine wave shall not be allowed to exceed the limit imposed by the A. I. E. E. standardization rules.

Bell Company Appeals from Janesville Decision.

Appeal has been filed at Madison, Wis., from the order of the Wisconsin Railroad Commission which directed the Wisconsin Telephone Co., and the Rock County Telephone Co., to make physical connection between their toll lines and local systems at Janesville, Wis. The appeal is taken by the Wisconsin company and will be tried in the Dane county circuit court. The complaint in the original action was made by E. D. McGowan, of Janesville. The Bell company prays that the order be set aside.

Toll Rates Fixed in La Crosse Case.

In a supplemental decision rendered under the physical connection law, the Wisconsin Railroad Commission has ruled that the charges for using the toll lines of a competing telephone company in La Crosse shall be five cents for a distance of not over 50 miles, 10 cents for a distance between 50 and 100 miles and 15 cents for all distances over 100 miles, in addition to the regular charges for long distance telephoning.

The decision was rendered in the case of Frank Winter against the La Crosse Telephone Co. and the Wisconsin Telephone Co. Mr. Winter brought the first action under the physical connection law in Wisconsin, asking that the two companies be required to connect their toll lines so that the subscribers of one company would be able to telephone to points at a distance over the lines of the other company.

The commission rendered a decision in favor of the Winter petition on May 14, 1913. Subsequently it developed that the companies were unable to determine the manner of making the physical connection, or the joint toll charges, or the apportionment of the charges. A subsequent hearing was held, and the decision now rendered settles the points in controversy.

In addition to prescribing the extra rates which shall be charged subscribers of one company using the long distance lines of the other company, the railroad commission orders the La Crosse Telephone Co. and the Wisconsin Telephone Co. to connect three trunk circuits in order to furnish joint toll line telephone service. Ten days is declared to be a reasonable time within which to comply with the order. The commission further says: "Neither of the companies shall absorb any such additional charges, but shall collect the same from its subscribers, and each of the companies shall be liable to the other and shall pay to the other the long distance tariff toll plus such additional charge. If this decision of tolls, after a fair trial, shall be found to be inequitable and the companies cannot agree upon a proper division of the tolls, the commission will by supplemental order establish such division."

The Wisconsin Telephone Co., to test the constitutionality of the physical connection law, appealed from the order of the railroad commission to the circuit court of Dane county. Since this case is still pending, it is probable that the Wisconsin company will take action to enjoin the enforcement of that provision of the supplemental decision requiring physical connection to be made within 10 days, and fixing the rates.

Colorado Utilities Commission Law Becomes Effective.

The bill passed by the 1913 legislature of Colorado establishing a public utilities commission and merging the state railroad commission therewith, which bill was prevented from becoming a law by a petition of voters to refer it to a referendum at an election this fall, has now been rendered operative through the issuance of an injunction restraining Secretary of State Pearce from referring the bill at the election. Two other referendums attacking respectively, sections 35, 36 and 37, and sections 35 and 36, will be submitted to the voters. These will not affect the bill as a whole.

The injunction against referring the bill to the people was secured at the instance of Attorney General Fred Farrar, upon information of Secretary of State Pearce. Many witnesses testified that hundreds of signatures on the petition were fraudulent. Assistant Attorney General Francis E. Bouck showed that the legitimate signers were fewer than 10,000, while the required number is 12,682. Julge Allen sustained the contention of the attorney general's office.

The scope of the new commission includes the regulation of all utilities and corporations, including telephone companies, in the state.

The commission is authorized to investigate any action on its own motion, instead of waiting for the filing of complaints by individuals. It has power to fix rates, compel physical additions and improvements and to issue summonses and writs for witnesses. It may also suspend any schedule of rates.

The three sections upon which the people are entitled to vote under referendum proceedings properly taken, modify the manner in which the utility corporations may be organized, and according to those who brought about their reference to the people, will tend to deflect capital from engaging in the utility business in Colorado. Section 35 of the law provides that before a utility corporation can begin operations in the state, it must obtain a certificate from the public utilities commission that public convenience and necessity require its construction. Sections 36 and 37 apply to the issuance of stocks and bonds and require the permission of the commission before any existing corporation can mortgage its property or merge with other concerns.

It is stated that A. P. Anderson and S. S. Kendall, two of the three railroad commissioners, are to serve in like capacities on the utilities commission. The third member is to be appointed by Governor Ammons, and he is expected to be George T. Bradley, the third member of the railroad commission.

Indianapolis Companies Co-operate With Commission.

Both the Central Union Telephone Co. and the Indianapolis Telephone Co. have written letters to the Public Service Commission promising to co-operate with the commission on any plan for the unification of the two plants. Sometime ago the commission wrote the companies that nothing would satisfy public sentiment but a consolidation and ordered them to consider plans for getting together. As a first step, the commission ordered a physical valuation of the properties taken. In their replies to the commission's recent urging, both companies state they have about completed the work of taking a physical valuation. Meantime plans for improvement of both plants have been brought to a standstill by the attitude of the commission which forbade either company going ahead with arrangements which would eventually mean duplication of equipment.

New Installation Rules in Washington.

New electrical rules have been issued by the Washington Public Service Commission governing all matters pertaining to the installation of wiring for telephone, telegraph and light and power lines. These amend and supplement the rules previously issued in connection with the act passed at the last session of the legislature. The most important of the new rules specifies the construction required at railroad crossings. It is anticipated that these new rules will meet with general favor as practically every interested company in the state was represented at the hearing, held recently in Seattle, Wash., which resulted in the new rules being issued.

Minimum Wage for Apprentices.

When the $9 minimum wage for telephone operators in Washington goes into effect, on September 7, apprentices employed in the state of Washington will be paid according to the following schedule which has been determined by the Industrial Welfare Commission of the state: For the first three months apprentice telephone operators will be paid not less than $6 per week; for the second two months, $6.60 per week; for the next two months, $7.20 per week; for the next two months, $7.80 per week, making a nine months apprenticeship in order to qualify for the full "minimum" wage. This policy will be followed in issuing apprenticeship permits in Seattle, Spokane and Tacoma as a trial, and may be changed later by the commission, which reserves the right to treat individual cases differently or to adopt different policies in communities where different living and working conditions prevail.

Telephone Situation at Spokane, Washington.

The Pacific Telephone & Telegraph Co. is said to be mailing notices to patrons of the Home company at Spokane, Wash., advising them that the automatic telephones will be discontinued as soon as possible after the consolidation of the two companies is approved and that Home subscribers who wish the Pacific telephone company's service should make contracts with the company in order to avoid delay. C. M. Fassett, commissioner of public utilities, is said to be sponsor for the following statement:

"While the city council and the Pacific telephone company have reached an agreement regarding the plant consolidation, we want to see that certain provisions for the protection of Independent long distance companies entering the city is written into the order of the federal court at Portland permitting the merger, before the Home service is discontinued. The Pacific franchise will come up for passage at the next council meeting and I presume will be passed as previously agreed upon. After the passage and acceptance by the company, the hearing on the consolidation, in the federal court at Portland, will take place, at which the city will be represented by counsel. The Pacific company has agreed that protection for the Independents now entering the city over the Home lines shall be covered by the merger decree. As to the settlement with the minority holders of the Home securities, the company has agreed they will be cared for."

On the other hand the Pacific telephone company announces that it is sending no notices to Home patrons other than such as have always been sent as a matter of business competition, and that the campaign for business has nothing whatever to do with the prospects of consolidation.

Amendments to the pending franchise of the Pacific Telephone & Telegraph Co. were considered at a recent meeting of the executive committee of the Public Ownership League, but action was deferred until the final draft of the amendments proposed are finished. These amendments will be submitted to the city council when the franchise comes up for passage. Should the city council not incorporate these, an attempt will be made by the league, it is said, to hold up the franchise with a referendum petition.

Would Amend Indiana Utility Law.

Plans have been under consideration by the Public Service Commission of Indiana to further possible action by the 1915 legislature to amend the utility law. The main features of the law, it is understood, will not be changed but several minor amendments, relating particularly to telephone companies, may be urged. A member of the commission is said to favor an amendment whereby small farmers' telephone exchanges and similar telephone companies will not be able to compel physical connection of their lines with larger systems.

Any attempt that may be made to tear down the Indiana utility law will come from the officials of cities and towns, a member of the commission said. He declared that published reports to the effect that utility owners might seek to abridge or hamper the work of the commission in the coming legislature were not true. He said that utility owners throughout the state are anxious that the law be kept on the statute books.

Receiver Appointed for Interstate of New Jersey.

James Kerney, of Trenton, N. J., has been appointed receiver of the Interstate Telephone Co. of New Jersey, under a bond of $50,000. Counsel for the company, while not consenting to the receivership, did not oppose it and did not deny the insolvency of the corporation. The company's annual income is $230,000 and it was admitted that revenues were diminishing. The receiver will continue the business. Mr. Kerney is a majority stockholder of the Trenton "Times" and the Trenton "Advertiser."

Telephone Service Between Monroe and Buffalo, Ind.

The controversy over connection between Monon and Buffalo, Ind., has been settled. Temporary service has been opened between the two points, and a metallic circuit is being extended for the permanent service.

Strategy and Force at Clinton, Ill.

Citizens of Clinton, Ill., led by State's Attorney Williams, of that city, recently pulled down poles which the Central Union Telephone Co. was erecting along North Woodlawn Avenue, North Walnut and South Elwin streets. Holes which had been dug for poles, but not yet used, were filled up. The citizens contend that the company has no franchise and therefore has no right to erect poles in the street.

Summary of State Commission Hearings and Rulings.

ARIZONA.

August 12: Communication from the Arizona Corporation Commission to the Mountain States Telephone & Telegraph Co. regarding informal complaint of unsatisfactory service

and excessive charges on the lines from Silver City to Mogollon, Cooney, Santa Rita, Hurley and Tyrone, advising that after considerable thought and investigation, it recommends the abolition of the flat charge of from $7.50 to $10 a month, and of the rate of 50 cents for one minute, 75 cents for two minutes, 85 cents for three minutes and $1.00 for four minutes' conversation, and substitution therefor of a zone system of charges with a three-minute minimum and a monthly minimum of $10 for the 26 subscribers on the 85-mile line, thus relieving the congestion and at the same time equalizing the rates.

CALIFORNIA.

August 13: Application by the Butte Valley Telephone Co., operating in the vicinity of Dorris, Siskiyou County, for authority to issue 22 shares of stock in lieu of other shares previously issued without the consent of the commission.

September 8: Hearing to be held at Bakersfield, Cal., in the case against the Pacific Telephone & Telegraph Co.

August 21: Farmers' Mutual Telephone Co., Ogden, Ill., authorized to equalize rates charged stockholders and non-stockholders.

August 21: People's Mutual Telephone Co., Hillsboro, Ill., ordered to abolish discriminatory rates and charge the following rates from August 1, 1914: Single line business telephone, $21 per year; single line residence telephone, $18 per year; two-party line residence telephone, $15 per year; multi-party line rural telephone, $15 per year; extra listing $6 per year.

August 21: Agreement entered into on January 28, 1914, between the Central Union Telephone Co., of Springfield, Ill., and the Avon Mutual Telephone Co., of Avon, Ill., for an inter-corporate business approved.

August 21: Farmers' Mutual Telephone Co., Milton, Ill., ordered to abolish discriminatory rates.

August 21: Traffic agreement between the Southern Telegraph & Telephone Co., of St. Louis, Mo., and the Southwestern & Recker Farmers' Telephone Associated, Recker, Ill., entered into on April 1, 1914, approved.

August 21: Sale of Plainville telephone switchboard, Plainville, Ill., by W. H. and Margaret G. Beavers to Frank and Mary Cochran, for $225, approved.

INDIANA.

August: Hearing held by Commissioner Edwards at Stone Bluff, Ind., in the case of the Attica, Ind., patrons of the telephone company at Stone Bluff, who seek relief from a toll charge of 10 cents a call from Attica. The patrons are now charged $1 a month and a toll of 10 cents for calls through Stone Bluff. The telephone company is opposing the petition on the ground that open service would greatly inconvenience them, besides make it difficult to keep the line open because of too free and unnecessary use of the line.

August 21: Hearing held on petition of the Citizens Telephone Co., of Columbus, Ind., for an increase of rates to rural subscribers.

MISSOURI.

August 15: Protest filed by The Liberty Telephone Co., of Liberty, Mo., against the pending application of the Kansas City Home Telephone Co., to construct lines and install exchanges in North Kansas City and Clay County. It is contended by the Liberty company that within the past six months it has expended more than $10,000 in supplying this territory with telephone service and that the board of trustees and citizens of North Kansas City and Clay County also are opposed to the Home company entering the field.

September 9: Hearing at Jefferson City, Mo., at which officials of the Southwestern Telegraph & Telephone Co. will have an opportunity to interrogate the commission's experts as to their valuation of the St. Louis exchange of the company.

NEBRASKA.

August: At a hearing the commission decided to give the Lincoln Telephone & Telegraph Co. permission to establish new rates at Harvard, Neb., and to give the company six months to make contemplated improvements. The Lincoln company will hereafter charge $3 and $2.50 for business telephones, $1.50 and $2 for residence telephones, $1.25 and $1.75 for two-party residence telephones and the company has permission to discontinue four-party lines. The patrons get the benefit of two consolidated exchanges and also service to Saronville and Inland.

August 8: Farmers' and Merchants' Telephone Co., of Alma, Neb., authorized to issue $8.000 of five year notes and $6,000 of capital stock to pay an indebtedness of $7,600 and to build a new exchange building.

August 20: Loup Valley Independent Telephone Co., of North Loup, Neb., granted permission to charge 25 cents more a month for desk telephones than for wall instruments.

NEW HAMPSHIRE.

September 8: Investigation at Concord to determine whether the New England Telephone & Telegraph Co. and various of its subsidiaries are complying with the provisions of chapter 141 of the laws of 1909, which statutes provide that persons residing within 500 feet of any telephone company shall be entitled to service for three months or more at the regular rate per month for yearly service plus 15 per cent. and the actual cost of installation. Complaints have come to the commission from several parts of the state to the effect that the New England companies, by insisting upon the performances of onerous conditions and by making excessive installation charges, have made this statute practically unworkable.

NEW MEXICO.

August 11: Recommendation that the Mountain States Telephone & Telegraph Co. reduce the exchange service fee to all mutual lines operated through the Aztec and Farmington exchanges to a basis of 50 cents per month per telephone where the lines are maintained by the owners; revise the toll charge between Aztec and Farmington exchanges to a basis of 10 cents for number calls and 15 cents for party calls; discontinue all free service between exchanges of Aztec and Farmington, and vice versa; and instruct operators at the Aztec and Farmington exchanges to give to the patrons of those exchanges the best and most expeditious service possible to do.

NEW YORK.

September 22: Hearing to be held in New York respecting the metropolital rates and appraisal of the property of the New York Telephone Co.

OHIO.

August 21: Order authorizing the Clinton Telephone Co., of Wilmington, Ohio, to issue its 5½ per cent. first mortgage bonds in the sum of $50.000 the proceeds of the sale of the bonds to be used for the construction and furnishing of a telephone exchange and central office building and ware room at Wilmington, $20,000; for new equipment to be installed therein, $22,000; and for new equipment and outside improvements in connection with the Sabina exchange, $8,000.

September 16: Postponed hearing at the request of the Central Union Telephone Co. on the company's protest on the valuation of its Lancaster property as fixed by the commission. This case arose out of the complaint of the city of Lancaster against the increased business rates established by the telephone company, effective on July 1.

PENNSYLVANIA.

August 20: Approval of the purchase by the Bell Telephone Co. of Pennsylvania, of the Saltillo Telephone Co., of Saltillo, Huntington County, and the LeRoy Telephone Co., Franklin County, as well as the purchase by the Economy Telephone Stock Co., of the Somerset County plant owned by W. G. Moon.

September 2: Hearing on application of the Bell Telephone Co. of Pennsylvania to construct, maintain and operate lines in accordance with the provisions of an ordinance passed by the borough of Highspire.

WISCONSIN.

August: Order directing the Omaha railway to furnish adequate telephone service between its station at Shell Lake, Wis., and the exchange of the Shell Lake Telephone Co. The exchange formerly was connected but the company refused to pay for service and the connection was removed.

Decision ordering the Cornell Telephone Co. to discontinue service to subscribers upon an extension built in the town of Holcombe, Wis., on the ground that the line was an unnecessary duplication of telephone facilities. The company had built the extension without commission authority under the impression that the town in question was an unincorporated village. Objection to the extension was made by the N. H. Denel Telephone Co., and the Chippewa County Telephone Co. The commission proceeded as if no line had been built and decided against the defendant company.

Decision requiring The Grange Hall Telephone Co., to discontinue service on an extension to Rock Elm, Wis. The commission had previously granted permission to build the line upon the alleged representation by the company that it would not interfere with any other company. Later the Highland Telephone Co. objected, stating that the proposed line would parallel its line for three miles. At a hearing the Grange Hall Telephone Co. contended that the subscribers by building and maintaining their own section of the line would secure a rate of $3 per item instead of the $12 rate of the Highland company. The commission declared the $12 rate not unreasonable and that if it were, the proper proceedure would be an action before the commission for a review of the rates.

From Factory and Salesroom

Convention: Indiana Independent Telephone Association, Indianapolis, Sept. 16, 17

Kellogg Switchboard Gives Good Service at Johnstown, Pa.

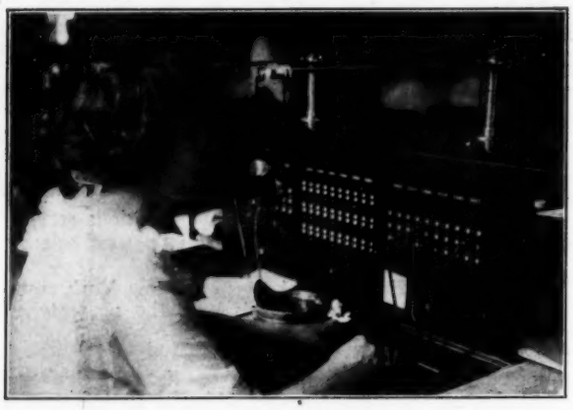
By Edward I. Pratt.

In 1901 a Kellogg common battery switchboard was installed in the city of Johnstown, Pa., which upon careful examination of the original apparatus, is found to be in a marvelous state of preservation. Comparison with this original equipment and new apparatus is easy, because in the first part of this year, the key shelf, keys and operator's set were removed and 40 additional lines added to each operator's position, giving a total of 200 lines to each position. The average is 320 telephones. These changes were made by the installation of the new Kellogg automatic recall system. Careful examination of this switchboard today, shows the old apparatus so good in appearance with very little wear, that if the observer did not know, he could hardly tell the old from the new.

There are few telephone men in this country who do not know Ed. Schade, general manager of the Johnstown Telephone Co., at least by reputation. Mr. Schade is plain spoken; he says just what he means, and means what he says. He is fearless, honest and unpretentious, and a good fellow. His hobby is the Johnstown, Pa., exchange, and it occupies the most of his waking thoughts. Similarly nearly everyone in Johnstown knows Mr. Schade, because of his keen personal interest in the success of the telephone installation from their standpoint. They encourage him and sometimes they enjoy teasing him. Recently a lady telephoned Mr. Schade, and while declining to give her name, complimented him on the service, but asked him what she was to do when her telephone rang while she was frying pancakes.

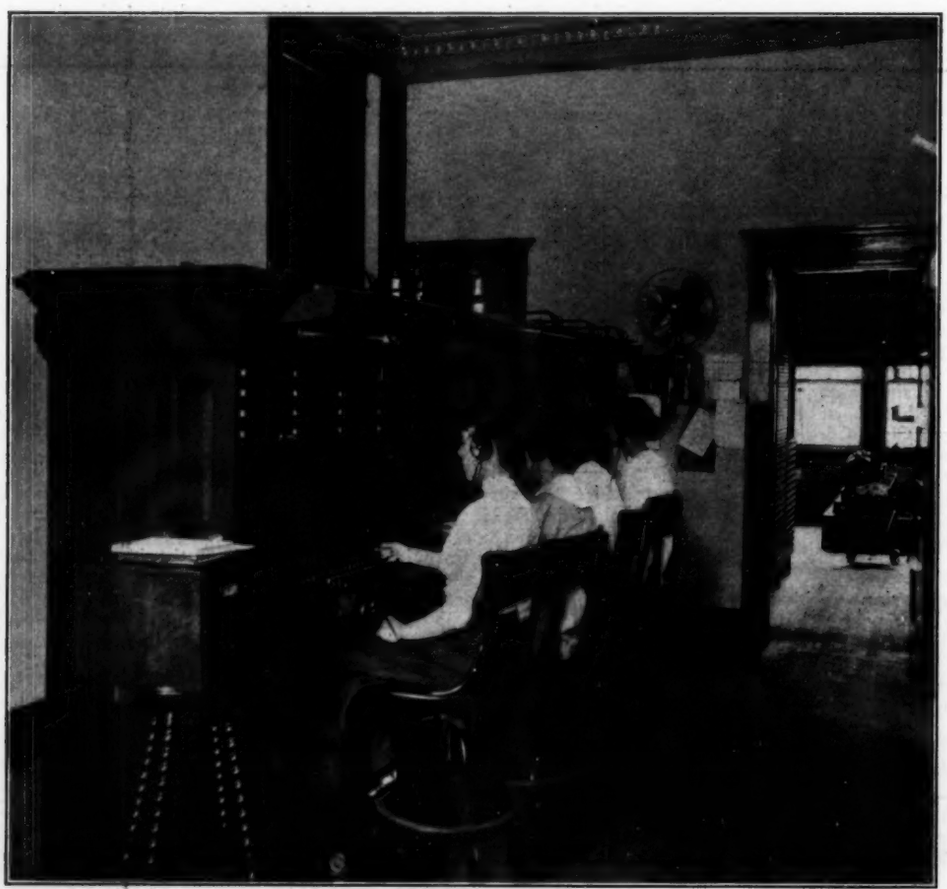
"Get an extension," he promptly replied.

It has not been all easy sailing for the Johnstown Telephone Co. Mr. Schade, in the last two years, has passed through a competitive fight, the equal of which has hardly been seen in this country, or elsewhere. Yet his switching plant



The 12-Year-Old Johnstown Service Desk.

Modern Methods Are Applied in Johnstown.



Switchboard in the Moxham Exchange of the Johnstown Telephone Co.

is today on a firmer foundation, more progressive and better thought of, than many other exchanges of similar size. In this competitive struggle, Mr. Schade had to combat everything from third rate telephones, almost a telephone free with every drink, up to captive advertising balloons which day and night promised everything in the category of exchange

Office Force of Johnstown Telephone Co.—General Manager Ed. D. Schade in His Office.

evolution. An imposing regiment of soliciting experts availed naught, and the opposition faded away, leaving the Johnstown exchange with a greater and growing subscribers' list. The people this year noticed, by reason of improved service, when the change to the automatic recall switchboard was made. Every operator has been giving better service to the subscribers, handling a greater amount of calls per unit of time, and with less confusion and useless back and forth questioning between operator and subscriber, than was essential under the old systems. Johnstown subscribers approve highly the efficiency of the new system, with its unique combination of telephone economies, such as automatic ringing, automatic listening, instantaneous recall, instantaneous disconnect, secret service and automatic peg count, which are proved practical by the dependable operation of this switchboard of the Johnstown company.

Those who have examined the board have been much surprised that all its parts could have stood up so well through long years of hard service. Every bit of the original installation that could be used was retained in changing to the new automatic recall system. The substitution of chest plate transmitters, for instance, showed Mr. Schade that a good way to fill up the holes where the original transmitter cords were, was to use them for pilot lamps. This was done, and the scheme has been found most satisfactory.

Charles Griffith, or "Doc" Griffith, as he is affectionately addressed by his friends, has stood firm all these years with Mr. Schade as a champion of the Kellogg common battery switchboard. The equipment is in charge of stanch admirers, and J. P. Carliss, superintendent of the company, heads a very loyal corps of workers, that helps to keep things humming.

The switchboard at the Moxham exchange of this company, shown in the accompanying illustration, is a small unit, which is a model for efficient arrangement and good service. Sometimes telephone managers do not like to have their switchboards photographed, unless every position is occupied by an operator, and will object to a board not filled up, regardless of what the usual load is and how it is handled. Some managers will insist on hurriedly securing some girls from the office to fill vacant chairs, fearing that a photograph of their switchboard not filled with operators, will indicate lax methods somewhere about the plant. Visitors may say, when they are shown the pictures framed on the office wall, "But you cannot give your subscribers the right kind of service with so few operators."

The Kellogg Automatic Recall System is changing this altogether. Now, managers take an actual pride in showing their board, just as it is, under an average load. They do this, knowing well that, whether they have vacant chairs in every other position or not, the girls at the board are working efficiently, because they are uniformly employed—

The Operating Room of the Johnstown Exchange.

not driven, but just comfortably busy, all the operators handling all the calls at the same speed, giving every subscriber the same prompt and efficient service.

The equipment of the Johnstown Telephone Co. is as complete out of the exchange room as within, as indicated by one of the accompanying illustrations, taken at the entrance of the storeroom. The car in the foreground has seen service for some six years, and is in excellent condition. In addition, there is a smaller one-seated car, both of which save time and vastly increase the efficiency of every employe using them.

Terminal Room of the Moxham Exchange.

Much of the outside construction of this exchange is unique, owing to the unusual arrangement of the houses in many districts adopted when Johnstown was built after the great flood. Not dreaming of how the city would spread out as it has done of late years, the inhabitants along miles of streets have built, so to speak, a double row of residences, one in front of the other. These houses are not very large and the yards surrounding them do not seem to be stinted as the result of this apparent dividing of the lots. It gives, however, a wonderfully, economical and satisfactory pole arrangement. The pole in each block serves in many squares practically twice the number of subscribers as in the average city street.

Another Instance of 1900 Dry Cell Service.

F. C. Marvin, manager of the Zumbrota Rural Telephone Co., Zumbrota, Minn., writes TELEPHONY in regard to the service given by a set of "1900" dry batteries, as follows:

"Here's a record for us and would like to know how it compares with others. On December 18, 1907, John Grimm put in a set of 1900 dry cells in the branch office of Dr. Claydon here in this village and they were taken out the 30th day of July, 1914. This is a life of about 6 years, 5 months and 12 days."

Heavy Buying Season Predicted.

In sending out its new illustrated price list, Smith & Hemenway Co., 150-152 Chambers Street, New York City, gives an indication of its optimistic view of the business outlook in the following announcement mailed with the price list:

"The tendency of the trade during the last three months, to permit stocks to become depleted, will undoubtedly create a bigger demand than manufacturers will be able promptly to meet. In anticipation of an unusually heavy buying season for the fall trade, which has already made itself felt, we take pleasure in advising you that we have on hand a larger stock than ever before, and we shall be glad to have you avail yourself thereof."

Gund Mfg. Co. Opens Louisville Office.

The Gund Mfg. Co., of La Crosse, Wis., has opened a new branch office at Louisville, Ky., to take care of the business within a radius of 200 miles of that city. The office is located in rooms 401-402 Courier Journal Building, and will be under the management of H. B. Anderson. Mr. Anderson is well known to telephone men in the Louisville territory.

Paragraphs.

THE DICKE TOOL CO., 61 Broadway, New York, will have ready for distribution about September 1, an up-to-date catalogue on tools for linemen's construction work.

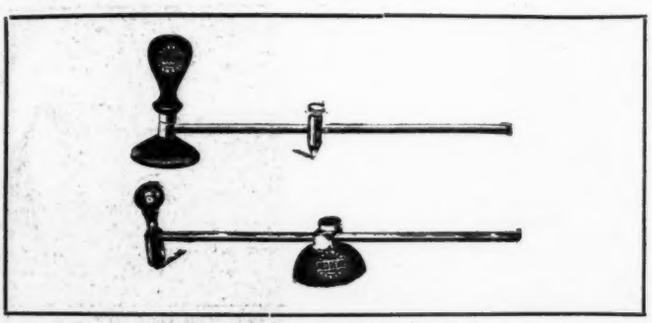
STROMBERG-CARLSON TELEPHONE MFG. CO., of Rochester, N. Y. has issued a circular listing lantern slides to be used for advertising by telephone companies. These may be had upon application to the company.

Two New "Red Devil" Circular Glass Cutters.

Since the advent of the automobile with its numerous and varied head lamps of all sizes, the demand for circular glass lights for these has increased to a surprising degree.

For the enterprising and economical motorist who wishes to replace his broken lights himself, the Smith & Hemenway Co., Inc., 140 Chambers Street, New York, the company which makes the widely known "Red Devil" glass cutters and electrical hand tools, has just brought out a most effective and handy circular glass cutter at a popular price. It will cut circles cleanly and neatly from 2 to 20 ins. in diameter, while a larger size will cut up to 40 ins. The accompanying illustration will give a general idea of this practical little cutter. It is simple but very effective, and will be found a handy tool to have about as a piece of circular glass is sometimes wanted badly.

To meet the demand for a better tool of this class, Smith & Hemenway is offering a circular cutter, style 263, with hand honed wheels which, it is declared, will cut sharp, clean circles from 2 ins. to 22 ins. in diameter, no unusual deftness being required to cut perfect circles with this tool. This is declared to be a high class tool in every respect.



"Red Devil" Circular Glass Cutters.

The strong metal base around which the cutter revolves, is lined with rubber to prevent slipping.

Both cutters are supplied with "Red Devil" cutting wheels, on the high qualities and cutting powers of which, the Smith & Hemenway Co. has largely based the business success which it enjoys.

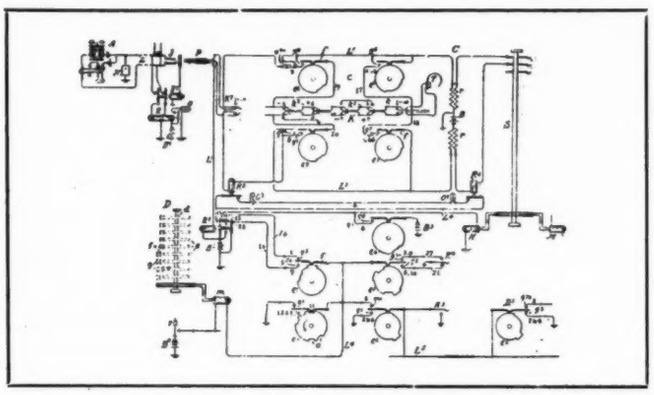
Joint Use of Poles in Lansing, Mich.

The Michigan State Telephone Co. and the city of Lansing, Mich., are negotiating for the joint use of poles, which, if agreed to, will eliminate 1,000 poles from the city streets.

Record of Telephone Patents Recently Issued

1,104,038. July 21, 1914. LIGHTNING ARRESTER; G. P. A. Damschen, Oconomowoc, Wis. A metallic block having an adjustable pointed electrode extending from it is inserted in series with each line wire. The ground block, also metallic, has integral conical electrodes extending from it in axial alinement with the line wire electrodes. The air gap may be adjusted by means of the elctrodes in the line wires.

1,104,061. July 21, 1914. CABLE AND METHOD OF FORMING AND CONNECTING IT; F. R. McBerty, New Rochelle, N. Y.; assigned to Western Electric Co. A method is described for



No. 1,104,956.

the construction and insulation of a multi-conductor switchboard cable. Insulating fabric is secured to the opposite side of a ribbon of wires, the fabric being made discontinuous along a line oblique to the length of the cable. The sections of the cable on the opposite sides of the oblique in insulated line are displaced laterally with respect to each other, so that the cable may be folded on itself along the oblique line to produce terminal projections of the wires.

1,104,062. July 21, 1914. WIRING SYSTEM FOR TELEPHONE EXCHANGES; F. R. McBerty, New Rochelle, N. Y.; assigned to Western Electric Co. Relates to selectors having terminals in curved rows, with brushes arranged to traverse the rows. Rows of terminals corresponding to the selector rows are located on a connecting rack. Cable, such as described in patent 1,104,062, is used to unite terminals of the successive rows on the selector with the corresponding terminals on the connecting rack.

1,104,451. July 21, 1914. TELEPHONE AUTOMATIC TRUNK SELECTING SYSTEM; M. Setter, Chicago; assigned to Automatic Electric Co., Chicago. A metallic wiper is adapted to traverse a row of trunk terminals. The wiper is caused to operate with a back and forth movement instead of a step by step movement, by means which include a spring that is wound by electrically operated machanism.

1,104,464. July 21. 1914. RATCHET MECHANISM; A. H. Adams, Sparkill, N. Y.; assigned to Western Electric Co. Describes a ratchet mechanism which is operated in connection with the armature of an electromagnet.

1,104,605. July 21, 1914. TELEPHONE SYSTEM FOR TRAINS; H. E. Barber and J. W. McFarland, Cherry Tree, Pa. The feature of this invention is a pole comprised of a plurality of flat sections so arranged that the sections may be folded in superimposed relation and supported within the caboose of a train.

1,104,610. July 21, 1914. RECEIVER FOR TELEPHONE; G. N. Blanchard and O. G. Minzenmayer, San Francisco, Cal. In this invention a wedge-shaped armature is detachably carried by the under side of a non-magnetic diaphragm. A double pole magnet has its polar faces shaped to conform to the under side of armature. This construction is claimed to increase the intensity of sound reproduction.

1,104,720. July 21, 1914. ELECTRICAL CONNECTION; B. B. Turner, Baltimore, Md. A plug and socket for connecting telephone receivers and similar connections is described. The socket consists of an elliptical collar and a circular having bowed spring arms connecting the collars and joined to the elliptical collar at the end of the short axes. The plug consists of two circular collars and bowed spring arms connecting the collar. One collar of the plug fits and takes a bearing in the circular collar of the socket.

13,776. July 21, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to The Telephone Improvement Co., Attica, N. Y. (Reissue, Original No. 956,484, dated April 26, 1910). A circuit is described in which the feature is a call register means.

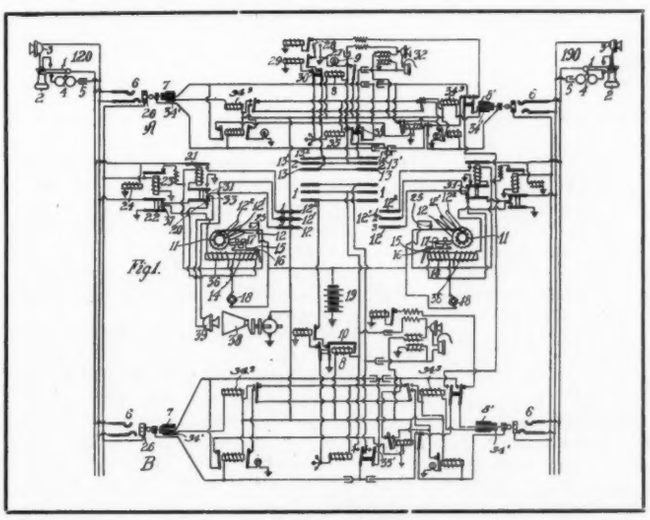
1,104,956. July 28, 1914. TELEPHONE OPERATOR'S EQUIPMENT; W. G. Blauvelt, N. Y., and E. C. Molina, Bloomfield, N. J.; assigned to American Telephone & Telegraph Co. The feature of this equipment is the operation of the automatic mechanism, located at the exchange, for connecting the operator with the calling party. The purpose is to reduce the number of motions necessary for the operator in making connections. The automatic switching mechanism is interposed between the connecting circuit and the operator's set. It is adapted, when started, to assume a series of circuit controlling positions. The travel of the switch and mechanism is started by means operable as an incident to the act of the operator in establishing a connection with the connecting circuit.

1,104,959. July 28, 1914. VACUUM LIGHTNING ARRESTER; F. S. Chapman, Toledo, Ohio; assigned to the National Electric Specialty Co., Toledo. A refractory shield is arranged adjacent to one or both electrodes of the arrester so as to prevent direct discharge between the electrodes, thus protecting the wall of the containing vessel from the intense heat produced by the discharge.

1,104,960. July 28, 1914. LIGHTNING ARRESTER; F. S. Chapman, Toledo, Ohio; assigned to the National Electric Specialty Co., Toledo. A vacuum lightning arrester having three electrodes is described. The electrodes are secured to a supporting element within the vessel which provides a barrier between the two of the electrodes.

1,104,961. July 28, 1914. LIGHTNING ARRESTER; P. H. Chapman and H. M. Pingen, Toledo, Ohio; assigned to the National Electric Co., Toledo. Another arrester of the vacuum type is described. It has mounting elements arranged at opposite ends of the vacuum tube. The elements are formed with spacing projections. The electrodes are disposed between the elements and held in place by attachment to one mounting element.

1,105,344. TELEPHONE SYSTEM; E. R. Corwin, Chicago; assigned to the Frank B. Cook Co., Chicago. A semi-automatic system is described. The calling subscribers are automatically connected to the talking equipment of idle operators and connections made with desired lines by means of link connectors at the exchange in combination with selecting mechanism for picking out the idle operators. The link connectors



No. 1,105,344.

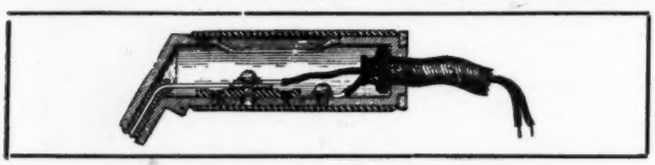
have operator controlled means to adapt them to their line joining function independently of the selecting mechanism. There are 54 claims included in this patent.

1,105,345. July 28, 1914. TELEPHONY; E. R. Corwin, Chicago; assigned to the Frank B. Cook Co., Chicago. Relates to an automatic system, in which either of two telephone lines may be connected with a third line, and establish a busy test condition in connection with the third line, thereby locking out stations seeking connection with the third line.

1,105,346. July 28, 1914. TELEPHONY; M. L. Johnson, Chi-

cago; assigned to the Frank B. Cook Co., Chicago. The feature of this system is the application to an automatic system, of methods for applying ringing current to the various sets on party lines.

1,105,347. July 28, 1914. TELEPHONY; M. L. Johnson, Chicago; assigned to the Frank B. Cook Co., Chicago. Methods for operating semi-automatic equipment in a multi-office common battery exchange are described. Link connectors are placed in the second exchange for connecting lines of that



No. 1,106,118.

exchange with the trunk line used in the establishment of a connection between lines of the two exchanges. Means are provided for removing the common battery of the second exchange from its normal relation with the connector united with the trunk line in the second exchange, to bring the common battery of the first exchange into operative association with the link connectors at the second exchange. A magnet is brought into circuit with the common battery at the first exchange to maintain the common battery in operative association with the link connectors at the second exchange. The magnet, when released, serves to effect the restoration of the normal relation of the common battery at the second exchange with the link connectors. There are 32 claims in connection with this patent.

1,105,348. July 28, 1914. TELEPHONE SYSTEM; C. A. Bals, Chicago; assigned to the Frank B. Cook Co., Chicago. An intercommunicating system without aid of an exchange is described. Switching mechanism in addition to the switch hook is provided at the subscriber's station for altering the circuit of an electromagnetically controlled mechanism, associated with one of the stations, to effect the telephonic disconnection of the station having the switch hook. A holding switch is supplied for preserving the circuit of the telephone line that has become telephonically disconnected from the line associated with the electromagnetically controlled mechanism.

1,105,349. July 28, 1914. SWITCHING MECHANISM; C. A. Bals, Chicago; assigned to the Frank B. Cook Co., Chicago. This switching mechanism is applicable to intercommunicating systems. It includes a switch-actuated bar which operates a swinging operative element. This element is held against movement by means of an electromagnet.

1,105,350. July 28, 1914. SIGNALING SYSTEM; M. L. Johnson, Chicago; assigned to the Frank B. Cook Co., Chicago. Signal receivers are selectively associated with telephone lines. Means, individual to the lines but differing from each other, cause signal receivers to give characteristic signals peculiar to the lines.

1,105,436. July 28, 1914. POLICE AND FIRE ALARM SYSTEM; G. L. Hughes, Chicago; assigned ½ to R. E. Cooper, Hopkinsville, Ky. This system is adapted for use in connection with a common battery telephone system. Its feature is a differential relay having two coils, one being permanently included in the main line. A switch is provided at the subscriber's station to shunt the other coil through the ground without interrupting the subscriber's circuit. Means, operated by the relay, establish telephonic connection between the subscriber's station and a special station.

1,105,485. July 28, 1914. INTERCOMMUNICATING TELEGRAPH OR TELEPHONE DEVICE; A. C. Carlson, Butler, Pa. An interconnecting device for telephone and telegraph lines is described. Pairs of jacks are secured to one end wall of a rectangular casing. Plugs, slidably mounted upon supports within the casing, are adapted to enter the adjacent pair of jacks. The arrangement is such that one circuit is broken when another is closed, thus releasing the other circuit when it is desired to use one circuit.

1,105,489. July 28, 1914. ELECTRICAL CONTACT; E. E. Clement, Washington, D. C. A blank for making contact springs is described.

1,105,490. July 28, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C. Relates to semi-automatic system. Means are described in this patent for the combination, with a plurality of lines to be inter-connected, of automatic switching apparatus for effecting the connection and manual controlling means for the switching apparatus. The latter comprises a variable signal transmitter constantly driven by a motor. A set of push buttons, adjustable to determine the signal, forms a part of the variable signal transmitter. Means operated from the transmitter normally prevent transmission through the buttons, but they are adapted to be set so as to commence the transmission at a definite predetermined point in each cycle of operation of the transmitter. Manually operated means are provided for connecting the transmitter and parts operated therefrom, to the switching apparatus.

1,105,491. July 28, 1914. ELECTRICAL SELECTIVE SWITCH; E. E. Clement, Washington, D. C. The construction details of an automatic switch are given in this patent. They refer especially to the construction of contacts and electromagnetic operating means.

1,105,492. July 28, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C. Relates to an impulse sending device for an automatic system. The feature is the provision of means for distributing the impulses, from a single impulse producing device, in recurring cycles so as to supply a predetermined distinctive number of impulses to each of a group of impulse transmitting conductors during each cycle. A set of switching keys correspond to and are connected with the respective transmitting conductors and are each adapted, when operated, to connect its conductor with a transmission circuit. This invention is intended to reduce the time required for sending the impulses for operating the automatic switches. There are 22 claims.

1,105,545. July 28, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C. The feature is a continuously driven multiple single impulse transmitting device which controls automatic switches for connecting lines. By means of this device the operator can directly control the connection without waiting for the various switches to complete their several operations. There are 53 claims incorporated in this patent.

1,105,563. July 28, 1914. TELEPHONY; M. L. Johnson, Chicago; assigned to the Frank B. Cook Co., Chicago. Describes an automatic system especially adapted to private branch exchanges. In connection with this patent 28 claims are made.

1,105,564. July 28, 1914. TELEPHONY; C. A. Bals, Chicago; assigned to the Frank B. Cook Co., Chicago. The feature of this patent are the circuit-changing keys with electromagnetic means for holding them in actuated position, and a bar common to all keys for restoring them.

1,105,589. July 28, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. Semi-automatic equipment is described. The calling subscribers are answered by operators and the desired connections effected by automatic mechanism controlled from the subscriber's station. The connective means consists of answering terminals having indicators associated with them; means adapted to automatically connect the terminal with lines in response to calls thereover; means for thereafter controlling the same over the lines; manually operated devices for connecting the lines through one or more links in accordance with the indications; and automatic switches electromagnetically controlled therethrough to complete the connections.

1,105,629. August 4, 1914. FOUR PARTY KEY; A. F. Dixon, Newark, N. J.; assigned to Western Electric Co. Relates to a simplification in the mounting and construction of the keys comprising the unit. The feature is a swinging latch plate by means of which the plunger is locked in a depressed position and prevented from turning.

1,105,664. August 4, 1914. INSULATED CLEAT; B. G. Jansson, Malden, Mass.; assigned to Blake Signal & Mfg. Co., Boston, Mass. An insulating cleat is tightly compressed upon the head of an nail, one face of the cleat being concaved and having a circular continuous marginal edge to grip wires. A central teat surrounds the nail and acts as a separation between wires when it is desired to support two of them under the same cleat.

1,105,811. August 4, 1914. SEQUENCE SWITCH; F. R. McBerty, New Rochelle, N. Y.; assigned to Western Electric Co. A cam is mounted on a rotary shaft and has its face cut to three different depths. The switch frames are mounted adjacent to the cam and the middle one is arranged to be operated by the cam thus to be moved away from or into contact with either of the other switch springs.

1,106,118. August 4, 1914. SWITCHBOARD PLUG; L. H. Snyder, White Lake, S. D. This telephone switchboard plug comprises a straight shaft with an integral metal body. Upon the metal part is an integral extension at an angle to the shaft. Connection to the plug is made in the extension part which is so arranged that a protecting plug shell may be slid over it. A lock nut holds the shell in place.

1,106,501. August 11, 1914. CALL REGISTERING TELEPHONE; F. D. Fader, John Tibb, and John Wilfred Tibb, Vancouver, B. C., Can. The feature of this call registering device is the provision of means which co-operates with the recording

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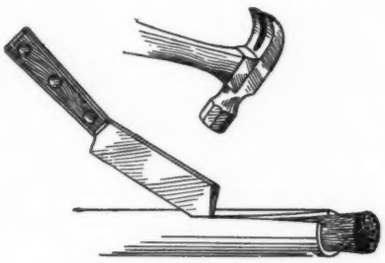

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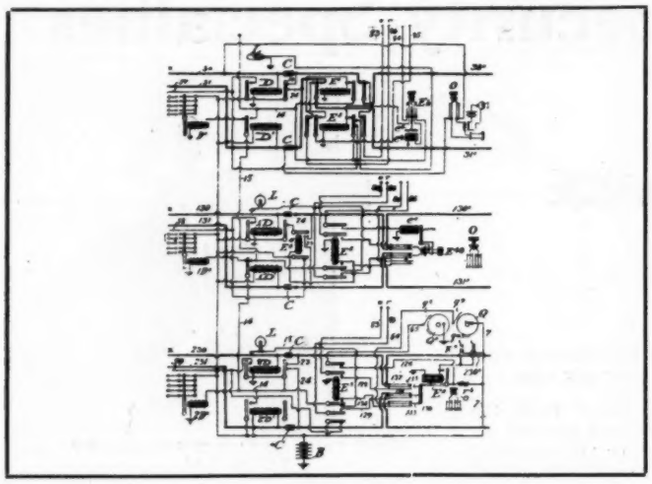
mechanism for automatically disconnecting the telephone circuit after a predetermined number of calls are recorded.

1,106,502. August 11, 1914. TELEPHONE SYSTEM; L. H. Snymers, Memphis, Mo. The distinguishing feature of this system is the provision by which a subscriber can ring or talk in one direction only or in both. The line is divided into



No. 1,107,143.

sections leading from one instrument to another, and provision is made so that the receiver and transmitter of a set may be selectively connected in circuit with either line section and the signaling mechanism in circuit with the opposite line section.

1,106,655. August 11, 1914. TELEPHONE CALL BELL OR RINGER; W. Kaisling, Chicago; assigned to Kellogg Switchboard & Supply Co. A rocking armature has its axis between the ends of a pair of magnet cores and is disposed to be magnetically controlled thereby. The biasing means includes permanent means, imparting a preponderating normal attractive stress always at the same side of the armature axis.

1,107,024. August 11, 1914. TELEPHONE; L. S. Boyce, Rockwell City, Iowa, and Oliver E. Boyce, Glencoe, Minn. A push button for inserting in the battery circuit of a local battery is described. By means of an arm attached to the switch hook, the push button may be locked into position thus closing the battery circuit for talking purposes.

1,107,133. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. G. Stevens, Attica, N. Y. Semi-automatic apparatus is described for a common battery exchange. An impulse transmitter at the substation is adapted to be set to make and break or ground the circuit according to a predetermined code. A line signal, normally connected to the line, is adapted to be operated by the action of the impulse transmitter and released when the central station is brought into connection with the line.

1,107,134. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. Relates especially to means whereby the calling subscriber has control of the ringing circuit.

1,107,135. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; AND APPARATUS: E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. The feature of this two-wire, semi-automatic system is the provision of automatic line switches for the central office. Link circuits are used for interconnecting the lines. Each switch comprises a row of line contacts each having a common member which has individual contacts corresponding to and in juxtaposition with the several line contacts. A desired unit line contact is closed for interconnecting with the common member through its corresponding contact by means of a spindle carrying a selective arm or stud which moves in a longitudinal direction.

1,107,136. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. The feature of this system is the provision of a selector switch adapted for distributing the calls among the operators or connecting apparatus.

1,105,137. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. In this semi-automatic system, the central office equipment comprises automatic switches requiring impulses over more than one circuit for their operation, and having distinctive actuating and controlled circuits. A pair of distributing relays each having a definite time constant, is controlled by the subscriber's relay and pointly controlls the several automatic switch circuits.

1,107,138. August 11, 1914. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. Relates to the provision of the central office connective apparatus, which responds to the makes and breaks in the subscriber's line circuit produced by the substation mechanism.

1,107,139. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. A semi-automatic system is described. It consists of the combination with automatic answering and connective devices, adapted to be controlled by calling subscribers, with manual means for effecting the initial selecion of the group containing the desired line.

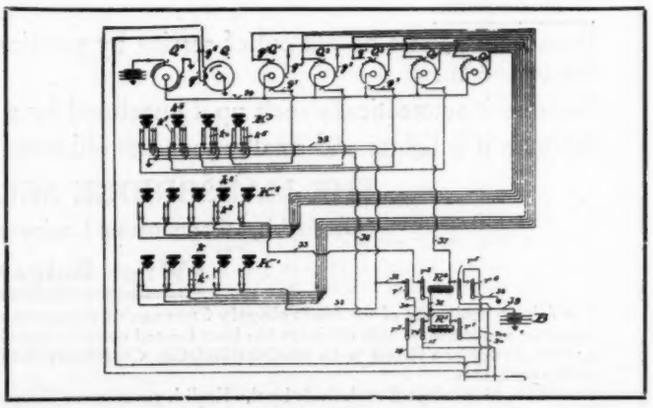
1,107,140. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. An automatic system is described in which connection is effected by a subscriber with the line of another subscriber by means of a sending device located in the subscriber's set. This sending device operates the connective apparatus in the central office. An electric lamp at each subscriber's station apprises the calling subscriber of the establishment of the connection.

1,107,141. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. An auxiliary switchboard having connection with a main manual board is described. It is provided with automatic auxiliary switching means to select and effect initial connection of the same lines apart from the main switchboard. It is designed to take care of the overload of the main switchboard during busy hours and to take the entire load during the periods of light traffic.

1,107,142. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. In this semi-automatic system an automatic switch is adapted to connect a calling line with an idle answering jack. The cord circuit terminates at one end in answering plug and the other end in an automatic selector switch. Provision is made whereby the switch is actuated to select a desired line, the actuating means being under control of the calling subscriber.

1,107,143. August 11, 1914. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. Automatic primary selectors are actuated, in response to a call over a line, to connect the calling line with an idle switching circuit. The switches in these circuits are controlled by operators by means of a bank of selecting push buttons and a set of continuous revolving associating commutators devices whereby the desired connection is affected.

1,107,144. August 11, 1914. TELEPHONE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. Connection of the operator with a calling subscriber is effected so that the number desired may be communicated to her. A series of rows of locking keys is adapted to be set to the desired line and station number. This series is under control of the operator to prepare the called



No. 1,107,144.

number for auxiliary automatic switching apparatus. Automatic means, comprising a plurality of independently and differently characterized electrical control circuits for controlling a switch in accordance with the number set, are associated with the switches to automatically signal a called line when selected. There are 49 claims made in this patent.